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Volume 6
Number 7
September 1988
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Group Editor
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Features Editor
Peter Davidson

Production Editor
Peter Glover

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Steve Turnbull

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Technical Editor
Mike Cook

Promotions Editor
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Telex: 265871 MONREF G
Quoting Ref. MAG001
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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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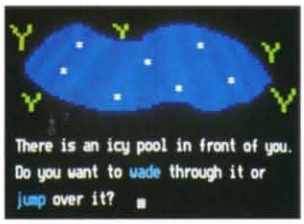

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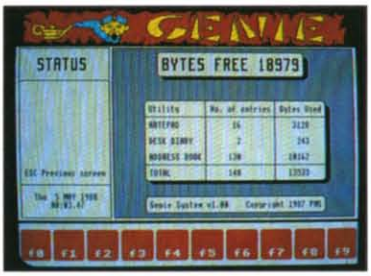

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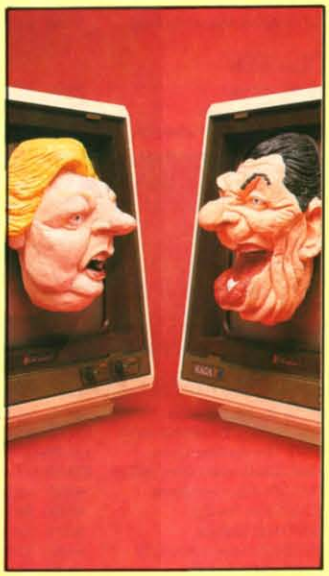
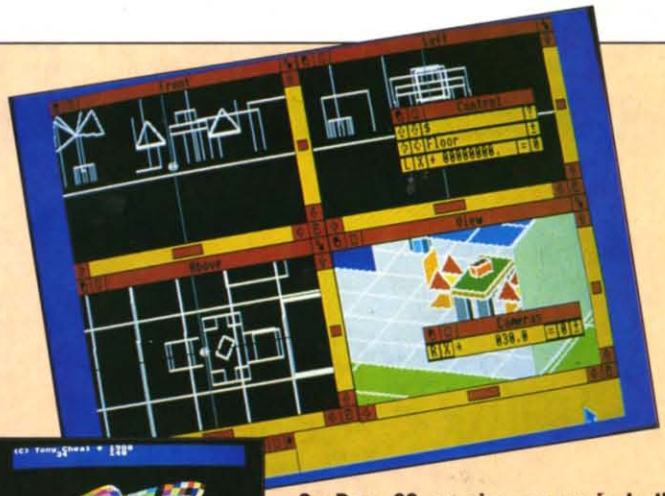


Cover story

Now you can have meaningful conversations with your micro with this experiment into artificial intelligence. Going far beyond the original Eliza, we present *Bertha*, a program that gives you a myriad of micro personalities who you can talk to.

Using the data files provided on this month's disc you can talk to Ronnie and Maggie – and with the utility program you can create a cast of thousands who will interact with themselves and you. Turn to Page 20 now to enter the brave new world of computer conversations.



On Page 99 we give you an in-depth review of Euclid, a new three-dimensional CAD package for the Archimedes. Now you can see the effect of your modifications as the changes ripple through the various views.

MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow readers of *The Micro User*. Turn to **Page 107** to find just what you're looking for – from cheap modems to complete computer systems.

For full details on how the checksums work, see the Get-it-Right article on Page 28 of the February 1988 issue of *The Micro User*.

The Type-it-in symbol indicates that the feature contains at least one full length listing for you to key in on your micro.

NEXT MONTH

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The software reviewed
Z88
New super link
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Using it made easy

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	Issue
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Mandelbrot	5
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MU9

NEWS beat

Acorn's big laser card deal

ACORN has achieved a major breakthrough in OEM sales of its Risc technology with the sale to Olivetti of £500,000 worth of laser printer controller cards based on the ARM Risc processor.

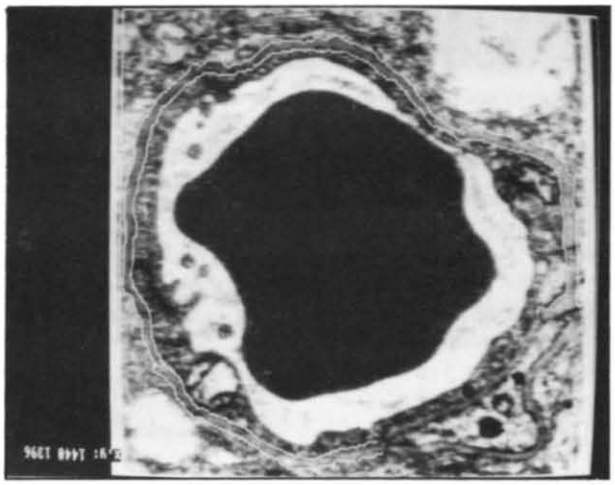
Managing director Harvey Coleman said: "The market for plug-in cards to drive laser engines is an immense one. Anticipated volume over the next three years runs into many hundreds of thousands of units.

"And Acorn is delivering a product for that market while others are still talking about chips or concepts.

"What we are offering is a means of allowing system suppliers to interface with the simplest laser engine and deliver a device supporting standard printer emulations or a very sophisticated system complete with a full page-description language at a higher performance yet lower cost than currently available".

The card has been designed by Acorn's development team in a short space of time and it is an application which demonstrates one of the capabilities of Acorn's Risc technology – that of a controller in a computing-intensive task.

While the first buyer of the new laser printer card is Olivetti, Acorn says it is able to sell the product to other volume system integrators and is already in discussion with more potential purchasers.



A digitised video image of a blood vesel, highly magnified

Arc gets the image

NEW developments have been announced by the Institute of Ophthalmology at London University, a leading innovator in image anaylsis software for Acorn machines.

The Archimedes version of the £150 Digit image analysis package can now be interfaced to video cameras and recorders – for measurement of video images – with the Watford Video Digitiser.

This allows video frames to be captured, measured and economically stored to disc, says Digit co-author Dr Brian Hayes (01-387 9621).

Digit uses the high resolution Summagraphics Bit Pad 2 digitiser tablet for tracing images, from photographs, direct from a microscope or from video screens. Objects to be counted or measured are traced with a cursor and outlined on the video screen, the digitiser tablet giving more accurate tracings than a mouse.

Digit then measures distances, lengths, widths, areas, perimeters, Feret diameters, shape factors and other measurements.

Tracings and measurements may be stored to disc, edited and printed out and measurements shown as histograms with mean and standard deviation.

Master has the answers

BRITISH rail passengers are getting up to the minute travel information from a Master 128.

The new automated timetable system at Hook in Hampshire has received nothing put praise from train users since its installation in April.

Display screens driven by the micro are placed throughout the station – in the booking hall, on the platform and even outside in the car park.

Passengers can call up timetables which are updated continuously to take account of changes in departure times, platform numbers, cancellations and late arrivals.

A badly delayed service is highlighted at the top of the screen.

The system switches itself on when the first train is due and off when the last train has departed.

If all else fails ... cheat

IF you can't beat 'em – cheat. Good news for frustrated fans of such classic titles as Elite, Ravenskull, Citadel and Xor is that Impact (0742 769950) has brought out a new range of poke discs.

The first offering from the rapidly growing Impact Games Club gives 20 pokes each on Vols I and II of Cheat it Again, Joe.

Impact's creator, Mark Botterill, said: "We think these pokes will give gamers much more fun than ever before, as games they have given up on will suddenly become easy.

"In Elite, for example, you can destroy any enemy ship with just one lethal super laser blast".

The pokes have been extensively tested to work with original and compilation versions of the 40 games, and are fully compatible with all BBC models. Price £3.99 on tape, £4.99 on disc.

Packed in

THE Publisher from Permanent Memory Systems (03552 32796), contains 64k of software and 16 fonts to produce superb effects direct from most popular word processors. It costs £45.

Z88 HELP ON THE LINE

LATEST special service to be added to MicroLink's ever-growing list of helpful sections for computer users is a helpline exclusively for Z88 owners.

Subscribers can access the MAG288 mailbox to consult Cambridge Computer experts, who have promised to dispense help and advice "and even answer users' moans".

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NEWS beat

Econet answers

ECONET users keen to develop and learn new skills can get help at a two-day conference starting on September 12.

Econet 88 at Newman College in the West Midlands will provide a range of activities to meet the needs of all types of network users, says the co-organiser Acorn (0223 245200).

Topics include the impact of Risc technology on network systems and future developments.

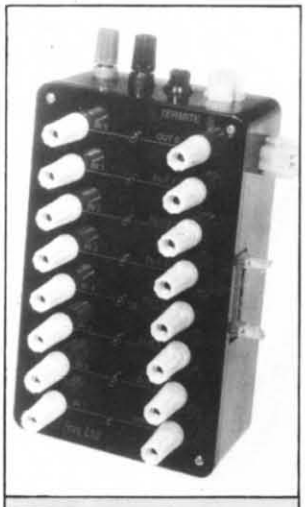
Delegates can choose their own activities from options including information for new network managers, advanced users, using networks in curriculum areas, communication, and software development.

Seminars and workshops will be organised to provide hands-on work experience covering a wide range of equipment and software.

Artisan, the superb creative design package now available for networking will also be put through its paces.

During the conference there will be an exhibition by leading software and hardware suppliers.

Acorn's new advanced fileservers for ARM-based products will be demonstrated using the Archimedes to show the speed that information can be stored and directed on to the Econet system.



Termite takes control

CONTROL systems specialist Paul Fray Computer Services has released a new interface for the BBC Micro.

Called Termite, it provides eight terminals independently programmable to any combination of input/outputs, and connects directly to the user port.

Suitable as a foundation for design projects in real-time control and robotics, Termite can drive motors and relays, sensors or simply switch light bulbs on.

Easily programmable in Basic, Termite costs £79.

Fax for the Arc

THE world of facsimile document transfer opens up for Archimedes users with Fax Pack from Computer Concepts.

Based around the firm's own 9600bps modem podule, it can send to and receive from group 2 and 3 Fax machines.

Three Fax Packs are available, ranging from modem and software only for £499 to a version including a flat-bed 300dpi grey scale document scanner for around £1,100.

Soon to be released by Computer Concepts (0442 63933) for the Z88 is SpellMaster. It will come in a rom cartridge with an in-built dictionary of nearly 60,000 words. Checking speed is in excess of 5,000 words a minute.

SpellMaster for the Archimedes has just been launched. It costs £59.

ENTRIES continue to pour in for the 1988 Micro User Innovation Awards.

Among the latest is a program for investigating the archaeo-physics of Stonehenge – a riddle that may be closer to solution thanks to this research by J.C.Belcher of West Yorkshire.

The international competition is open to all BBC Micro users – individuals, groups, schools, institutions and businesses.

And the projects entered for consideration can be serious, commercial, scientific or just plain fun.

The prizes in the BBC Micro section include an Archimedes, while the winner in the Archimedes section will take home a 24 pin Brother 1709 printer.

Closing date for entries is October 14, and an entry form appears on page 101. Winners will be declared at the Electron & BBC Micro User Show in November.

Speedy spell check

AN operating speed more than 3.5 times faster than its nearest rival is claimed for an Archimedes spelling checker being developed by Colton Software for use with its Pipedream integrated spreadsheet/word processor.

"I expect the product to contain around 90,000 words – possibly even 100,000", said Rob McMillan, managing director of Colton (0954 211472).

"It will run at about 37,000wpm, which is way ahead of its closest rival on the Archimedes which delivers about 10,000wpm".

● *In our review of PipeDream from Colton Software last month the phone number given was incorrect – the above number is right.*

Reading for rainy summer days

JUST in time to catch the tail end of the holiday season, Dabs Press has published a pile of reading matter for micro owners to take away with them.

First out is C:A Dabhand Guide, 512 pages including chapters specific to the BBC Micro, Master and Archimedes. Price £14.95.

The £7.95 support disc for the BBC Micro is based on Beebug C, and there are PC discs available for those running Zorland C on the Master 512 co-processor.

Archimedes Assembly Language has 368 pages and costs £14.95. It covers subjects like using SWI calls, graphics, and how to convert Basic programs into Assembler.

Due out any day now are the Dabhand Guides to Mini Office II – 280 pages for £9.95 – and the Master 512 – £14.95, programs disc £7.95.

Dabs Press (061-773 2413) is also planning a new series of books called MiniGuides with the titles of Archimedes First Steps, Archimedes PC Emulator, Using InterBase, ADFS and Basic V.

These will contain around 100 pages each, cost £9.95 and should be available in the autumn.

On the software scene, Dabs is soon to release Alerion, described as "an addictive shoot-'em-up game for the Archimedes". Price £14.95.

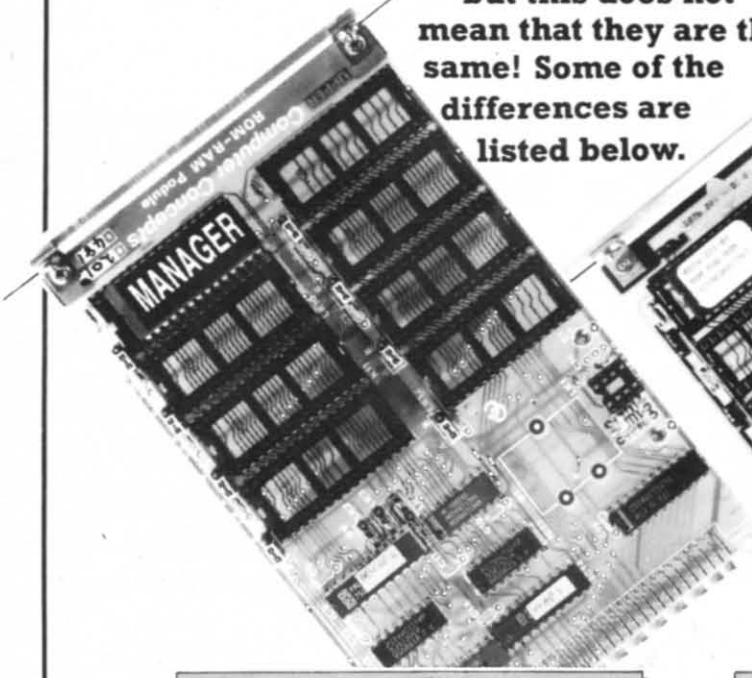
Also from Dabs comes the fully Epson-compatible Mini-Driver, the first software product offering real support for all versions of Mini Office II. It provides printer power from within any module and a viewdata terminal in the comms.

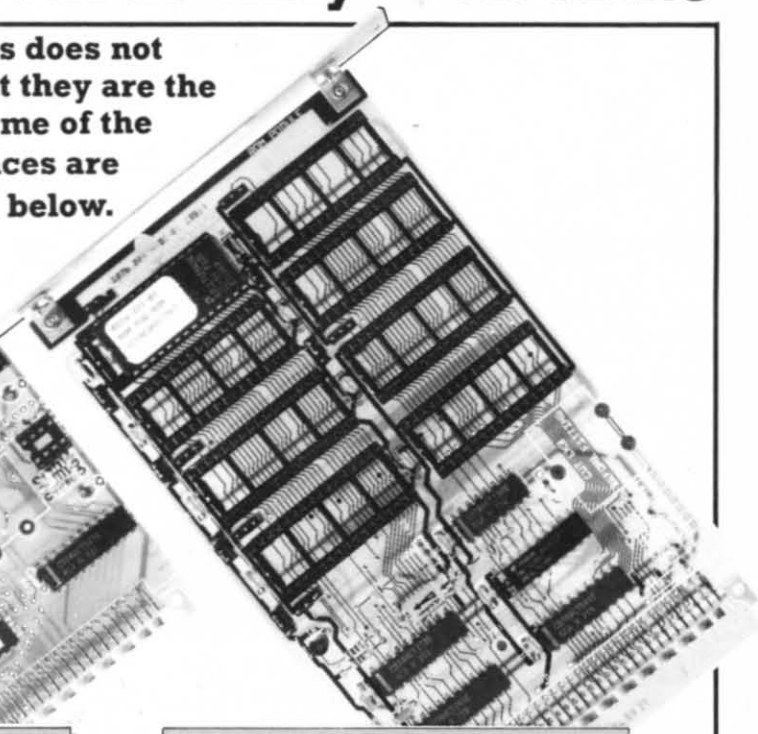
MiniDriver, price £24.95, includes rom and a disc with sideways ram image and demonstrations.

A sideways ram version without the rom is available for £19.95.

The two ROM boards may look alike

but this does not mean that they are the same! Some of the differences are listed below.





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8 files open at once	1 file open at once
Complete RAM filing system	NO RAM filing system
Multiple boards extend RAM filing system	Not possible
896k RAM maximum per board	64k RAM possible per board
Price £49.00 + VAT	Price £59.00 + VAT

The potential for Archimedes software without a ROM podule is severely limited. There will be many ROM based programs in future, in addition to INTER-WORD, SHEET, CHART and SPELL-MASTER, which are already available. Remember, ROM based programs on the Archimedes still have many of the same advantages over disc based programs that they had on the BBC; programs load faster, they are more reliable, they are permanently available and, most important, such programs can use overlay techniques to save a large proportion of the available memory. Consider running a document processor, spelling checker, drawing program and perhaps a thesaurus; the total program size could easily be over 600K—totally impractical, even on a 1 Meg machine.

In addition the Computer Concepts' board can be used as a very fast RAM filing system, and our experience is that many boards are used for this. A program that uses the floppy disc intensively will gain from the RAM filing system, which is about 10 times faster than floppy.

Our board is fast, cheap, flexible, expandable and easy to use. We also provide a no quibble money back guarantee. In a comparison, the facts speak for themselves.

Please note: A backplane must be fitted in order to install any podule expansion card.

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NEWS beat

Oil rig disaster hits new game

A BIZARRE twist of fate has left Superior Software counting the cost of good taste. Just days before the Piper Alpha disaster claimed 166 lives, Superior had completed Pipeline – a game in which fires and explosions engulf a North Sea oil rig.

"We even had a character in it called Red O'Hare", said Superior's Steve Hanson. "Its scenario was so similar to the real-life disaster we decided to withdraw the game rather than risk being guilty of ghoulish bad taste".

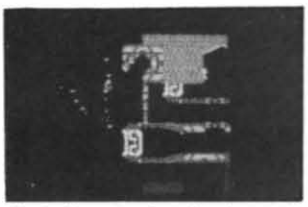
The decision will cost Superior thousands of pounds – even the packaging artwork had been completed – but the game is not a complete write-off.

Still entitled Pipeline, it will be released later this month – but re-written as a space adventure involving a sulphur mine on one of Saturn's moons.

Pipeline will be followed in October by One Night in Bangkok, a 64-screen mixture of arcade adventure and 3D chess puzzles.

November sees the launch of Exile, a space adventure Steve Hanson forecasts will be the biggest selling BBC Micro game at Christmas.

In addition, between now and the end of 1988 three Archimedes games are planned "including one blockbuster and a Repton compilation".



First glimpse of a development screen from Exile

Pipeline – now a space adventure

Peartree lives on

TWO familiar names in the world of Acorn computing have come together to form a powerful new company called Peartree Dram.

Troubled Peartree Computers – producer of innovative ram and rom boards, foreign language word processing software, music synthesisers and disc upgrade kits for the BBC Micro – finally went into receivership in June.

"We'd been watching Peartree for some time and had no hesitation making an offer", Dram Electronics managing director John Landells told *The Micro User*.

"The combination of Dram's position as leading supplier of memory chips and boards to major distributors and Peartree's expertise in education and mail order creates a strong base to build from".

Landells revealed that the Music 500 synthesiser accounted for half the value of Peartree stock purchased by Dram.

"There is no doubt in my mind that this product will continue to sell for a long time – particularly as we intend to continue developing and improving it", he said.

Former Peartree boss Vartan Mudigian will be sales manager of Peartree Dram.

Keyboard upgrade

IF you have a Watford or Acorn 512 co-processor for your BBC Micro and wish you had access to the all-important numeric keypad then wish no more.

Programmable Systems Design (027-581 3570) has provided an upgrade service which allows users to access the special IBM keys from the normal BBC Micro keyboard.

"This will allow users the same wide choice of software that Master owners have", said PSD boss Ken Fullbrook.

"An important feature of the new keys is that they are implemented at both the Ascii and IBM key-code level to provide good Master compatibility".

The numeric keypad solution can be obtained by sending a copy of your Dosplus boot disc and £15 to PSD.

Lancelot jousts again

A BLOCKBUSTER illustrated adventure game based on the legend of King Arthur is to be unveiled by Level 9 for the BBC Master and expanded BBC Micro.

Lancelot is the second title to be released by the specialist software house under the exclusive Mandarin label – the first being the Time & Magik trilogy.

Extensively researched to ensure authenticity, the package contains three separate adventures – with over 60,000 words of text interspersed with high quality graphics.

In the main, Lancelot – the game – follows closely the definitive book on King Arthur, Sir Thomas Malory's "Le Morte D'Arthur", first published by William Caxton in 1485.

Pete Austin of Level 9, himself an authority on King Arthur, insists that this is the "best game to date" from the company that is the acknowledged world leader in adventure software.

"The legends of King Arthur and his Knights of the Round Table are known to all", says Pete. "But it is a sad fact that most modern interpretations seem to owe nothing to the original tales.

"Most people will have seen software with Arthurian titles which turn out to involve 'Merlin' jumping from platform to platform while zapping orcs with fireball spells.

"Well, we got tired of waiting for someone else to do a proper job, so here's our faithful interpretation of the Arthurian saga".

The package, which includes a background book, costs £14.95.

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NB It is essential to state machine and 40/80T when ordering software

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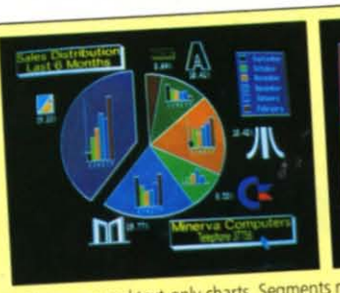
System Delta is the most comprehensive database available yet. It's so simple to operate that it has already become the standard in educational fields. It is very professional and pleasing in its presentation, making full use of the genuine Archimedes WIMP environment. It can handle vast amounts of data in the office, school or home, with its capacity of 2.14 billion records and 16 million fields. Its multiple 'key fields' allow any record to be found in 1 sec. even in a file of 20,000 records.

It maximises on the Archimedes' speed and has unique multi-tasking allowing an operation to continue on one file whilst performing a search or print on another. Easy file creation using free format screens with eight data types. Multiple display, print and report formats with each file including a user defined label facility. Three methods of search from simple option selection to in-depth multiple criteria, multiple fields or results of formulae. Comprehensive maths facilities allow results to be placed in other fields. Fast sort by any criteria on any number of fields. Transfer fields from one database to another. Imports data from other databases, exports data to Gamma and Sigma. Absolutely no programming required – but if you wish to program or customise then of course, we provide a full set of commands for you.

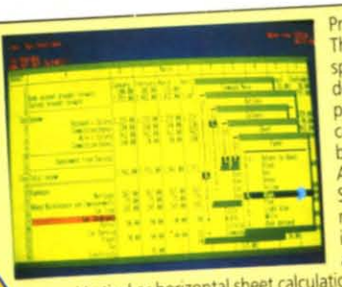
GAMMA PLOT

Seeing is believing! GammaPlot is an extensive chart/graph plotting program with a full art package included. It allows even a novice to produce stunning charts and drawings on one screen. Several charts may be placed on one sheet, in any position with text or drawings to make the data easily understood.



GammaPlot supports six main graph and chart types of line, scatter, pie, histogram, 3D histogram and text-only charts. Segments may be highlighted or percentages, values and labels switched on. Statistics are also available. Choose from the text styles supplied or any of the native Archimedes 'pretty fonts' or even define your own, and any of these can be enlarged or reduced. Various shapes, patterns and borders are supplied with a full 256 colour range. Full zoom facility. Various pen types are provided to draw pictures or add signatures. Import digitised pictures or company logos. Print facilities include colour output. Data entry is via the key board or any Delta, Gamma or Sigma file.

SIGMA SHEET



Probably the largest and fastest spreadsheet on any small business micro! The massive sheet size is 1000 columns by 16000 rows. Definable colours, spacing, and widths. Various cell formats including justification, up to 17 decimal places, preceding currency sign, bracketed or coloured negatives, percentage, exponential. Select to display the formulae instead of calculated sheet for really fast and easy sheet set up. Cell references may be alphanumeric or by label for ease of use, eg. A2 or "Jan' sales". Automatic relative or absolute reference adjustment while replicating. Simple yet extensive maths allowing calculations based upon references to other cells. Over 30 maths/statistical functions including SUM, AVG, COUNT, MAX, SIN, LOG, SQR, etc. Full date and time handling. Makes use of Maths co-processor, if fitted. Vertical or horizontal sheet calculation or intelligent mode which always gets it right no matter how the sheet is set up. Imports files from System Delta and most spreadsheets. Exports data to Gamma Range.

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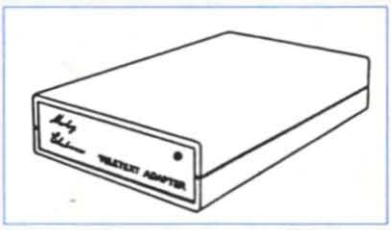
By British Rail: VICTORIA STATION. The halls are a 10 minute walk from the station.

By Bus: 11, 24, 29, 70, 76 and Red Arrow 507 to Victoria Street – alight Army and Navy Stores.

TELETEXT ADAPTER

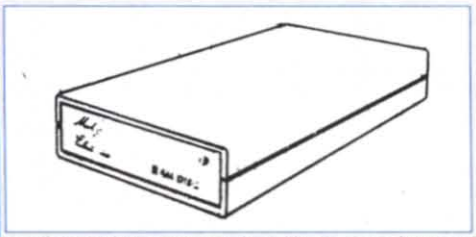
Would you like access to free high quality software and over a thousand pages of information, but Prestel access charges and phone bills too expensive? Then read on!
The answer is Teletext. Yes the same system everyone has seen incorporated into television sets, but with a difference. When Teletext is read by a computer you can actually use the data.
The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system.
With the Morley adapter you will get a state of the art unit that automatically tunes itself into the required station (no more messing around with screwdrivers or twiddling little knobs in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

FEATURES:
* Advanced design uses the latest technology, will handle ANY future enhancements to the Teletext system e.g.: full field; 8 bit data transfer; 2k pages etc.
* Simply plugs into the user port.
* Low power consumption, less than 200ma. Optional power supply available.
* User friendly menu driven software including extended OSCLI and OSWord commands for access from BASIC programs.
* Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.
* FREE Telesoftware, no access charges (updated weekly).
* Save selected pages to disc/tape for later retrieval.
* Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.
* Gives you a real-time clock at your disposal (*TIME).
* Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
* Easy to follow comprehensive user guides.
* No hardware limitations, it can for example receive virtually unlimited numbers of channels.
* Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).



WHAT THE REVIEWERS SAID:
". . .In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."–*(Acorn User, January, 1986).*
". . .The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."–*(A&B Computing, June, 1986).*
". . .Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."–*(The Times Educational Supplement, September, 1986).*
THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.

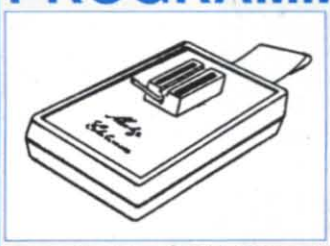
RAMDISC



Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

FEATURES:
One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.
Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.

EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case Also included in the package is it's own user friendly menu driven software on ROM or disc.
This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

THE HARDWARE
The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.

THE SOFTWARE
The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.
The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS.
Immediate delivery no quibble 12 month guarantee.

MASTER CARTRIDGE

Designed and manufactured by Care Electronics to Acorn specifications.
These high quality Master expansion cartridges will take two 16k sideways ROM's, and will, unlike similar cartridges available from other manufacturers, accept the new second generation programs, such as Computer Concepts Interword and Spellmaster ROM's.
These Cartridges come in a high quality, robust, formed-plastic case, that fits neatly into either one of the Master's cartridge slots.
QUADS–also available quad cartridges, specifications as Duels but 4x16k ROM's.

MASTER SMART CARTRIDGE

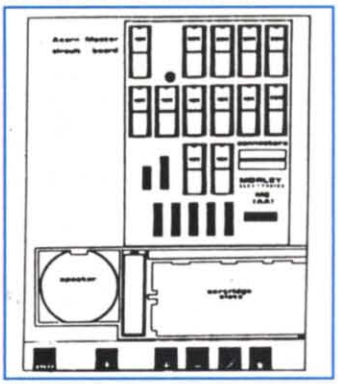
This device was designed and manufactured jointly by Morley and Care Electronics.
The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.
The **Smart** cartridge will prove useful to the novice, allowing him to do the simple things like dump any screen to printer, and make backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

BUILT IN FEATURES (at the press of a button)
Autosaves computer's entire memory.
Freeze program at any point.
Screen dump (any mode) to printer or disc.
Allows any OSCLI command without disturbing memory.
Copies 90% of protected software.
Tape to disc, disc to tape.
User friendly menu.
Sound On/Off.

ALL CARTRIDGES COME WITH A 12 MONTH NO QUIBBLE WARRANTY

NEW PRODUCT

MORLEY MASTER BOARD 'AA'



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Telex: 265871 A/B MONREF G
(Quoting Mag 70211)

At long last the add-on all MASTER users have been waiting for, an internal ROM board.

No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.

The new **MORLEY MASTER BOARD "AA"** allows you to have up to 8x16k and 4x32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permanently, whilst retaining the standard 4 x sideways ram banks and four banks by using cartridges

A staggering 32 ROM images installed and accessible at any time

Included in the package is a utility ROM which has many useful features such as 'FICOPY', a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

So for less than the price of four external cartridges you get a MASTER BOARD "AA" which with twice the capacity has got to be **THE** ROM expansion for the serious MASTER user.

The unit comes with the usual Morley, full no-quibble twelve months warranty, and our usual after sales service

THE COMPLETE RANGE OF TELETEXT SOFTWARE from M/B SOFTWARE

***NEW . . . DESIGN 7 PLUS** – now 'the best' is even better. Held in high regard by reviewers and hundreds of satisfied owners, DESIGN 7 has been further improved, with revised keystrip & even more features. Design/load/save and MODE 7 screen with ease, up to full CEEFAX/Oracle standard. Will convert ANY MODE 7 screen to a BASIC procedure, for inclusion in your own programs. ROM version includes a file copier, printer dumps useable from BASIC etc. B/MASTER/COMPACT.

TELETEXT EMULATORS/SCREEN DISPLAYS/INFORMATION SYSTEMS – A complete range of teletext programs to cater for all needs, with full teletext adapter interfacing.

***NEW . . . DESFAX** – totally new version – streets ahead of the competition – run your own information/display system. Stores hundreds of screens on dual 80 track drives (96 screens on single-sided 40 track), with access to any screen with a SINGLE KEYPRESS. Lots of special effects – screens can scroll, slide, overwrite etc. Animation, loops, subroutines – send for details – not enough space here to even begin to describe the advanced features!! B/MASTER/COMPACT

***NEW . . . MASTERFAX** – 84 MODE 7 screens in memory at once. 148 screens possible with cartridge RAM. An advanced teletext/carousel program featuring SINGLE KEYPRESS or 3-digit page selection. Runs entirely from memory – no disc accesses after pages are loaded. Superb animation and other effects. MASTER/COMPACT only.

***NEW . . . VU-FAX** – 1000 screens and no disc accesses! Screens stored on MORLEY 1MByte RAM DISC. SINGLE KEYPRESS gives instant access to any screen (or emulate teletext). This is the ultimate MODE 7 screen management system – there is nothing else like it. MODEL B/MASTER 128.

***ALSO . . . MASTERcopy** – DFS/DFS, DFS/ADFS, ADFS/DFS, ADFS/ADFS file copier. Uses the MASTER 128's memory to the full to permit fast disc copying. 31 DFS files to ADFS disc in less than 2 minutes. Creates directories automatically. You will wonder how you ever managed without this program. Described by reviewers as 'unexcelled'. MASTER 128 and COMPACT's fitted with DFS ROMS.

ORDER FORM

To order simply complete and return by post enclosing your cheque/P.O. made payable to Morley Electronics, or by phone during office hours, quoting your ACCESS or VISA number.

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Telex: 265871 A/B MONREF G (Quoting Mag 70211)

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A chat with Bertha

Now you can converse with the famous using Mark de Weger's routine

Bertha – our micro version of the famous Eliza – is a program that composes dialogues so you can create characters that talk either to each other or to you. They can discuss micros, politics, your neighbour or, in fact, anything you want. Bertha could be regarded as an artificial intelligence type of program, but it's also very enjoyable and even educational. It runs on any BBC Micro and you can have an even longer conversation on an Archimedes.

Characters are built by creating files that contain their vocabularies. The two main parts are keywords and a maximum of six responses associated with each. When the conversation is going each reply of the character that *spoke* before is searched for keywords that are known by the next. It then responds with an appropriate phrase.

"Making the response random can add extra fun"

Creating characters

The data files which represent a persona consist of these elements:

- Name, such as Maggie or Ronnie.
- Start lines, from which one is randomly chosen by Bertha to be displayed on the screen either at the start of the dialogue, or when there is no statement from the other characters to react to.
- End lines, chosen to finish the conversation.
- Keywords with associated responses. Recognition ignores upper and lower case.

MODIFICATIONS

The first lines of both programs contain the variables that determine how many items the data files may contain. These are:

Characters taking part	4
Start lines	7
End lines	4
Keywords	24
Responses per keyword	6
Length of dialogue	100

These can be increased by changing the variables in both programs. If you are using an Archimedes 310 the variables can be set at least 20 times this size – but the edit program may need some modifications if you make the variables very big.

Below is part of the data file D.Maggie – which you'll find on the monthly disc – as an example.

As you can see, the character's name is Maggie. There are five start lines, followed by

```
Maggie

How're things in the Gulf these days, Ronnie
Sorry to ring you so early, Ronnie, but it's
Afternoon Mr President, did you have a good
What are you going to do after November 198
Hello Ronnie, how's Nancy?

Bye Ronnie, give my regards to Nancy.
Say hello to Ollie, when you next visit him.
And don't press any buttons you shouldn't.

bomb
why exactly do you want to bomb Esher?
If you have the bomb, you should let us hav
I don't think it's a good idea to bomb the
Well, dialogue with the Russians is very p
Perhaps a dialogue with Khomeni would be b

iran
Listen, that million pound deal with Iran is
you know Iran, that's the sandy bit north of
If Khomeni doesn't wise up you'll have to bom
Fancy going there in November for a rest?
```

add extra fun for experienced players and it also associated responses.

Type in the data editor – Listing I – and ensure

it is correct, using the checksums. Save it as CARDED and run it. Most of the options are self-explanatory, but note that in options four and five you can opt for a number and change that line. It can be deleted by pressing Return when asked for new data. Don't worry about empty entries, as they are deleted when a file is saved.

In a similar way you can edit keywords and responses from option six. First you need to enter the number, after which you can edit it or one of its associated responses. Option seven sends all data to the printer.

Having a conversation

Once you have defined one or more characters they may take part in the conversation. You may also take part yourself by entering responses at the keyboard.

Type in and check Listing II – the Bertha program – and save it.

Run Bertha and enter your name. You will be asked how many columns on screen you want, either 40 in Mode 7 or 80 in Mode 3. The latter is a bit clearer but can only be chosen if you have screen shadow ram – otherwise you can expect a *Bad mode* error.

Next you are asked if you want to load new characters – always enter *Y* the first time you run Bertha. Answer *2* for the number of characters to load: Then you need to enter the names of the data files. If you have the monthly disc use D.Ronnie and D.Maggie.

Next you will be asked some questions about the dialogue: The first one is how many characters should take place in it – not including yourself at the keyboard – so enter *2*. Next specify whether you wish to take part in the dialogue yourself – it's best to answer *N* until you get used to the way Bertha behaves.

If the number of people taking part – including yourself – is greater than two, you will be asked whether the response character should be random. If you answer *Y* the person that will speak is not the next one in the order of loaded files, but will be determined randomly.

Making the response character random can add extra fun for experienced Berthas and it also makes creating a conversation more difficult, as in every case any character must be able to reply to any other.

The final question considers the length of the dialogue – the number of times each person speaks. If you make it too long it will contain repetitions of statements made by the characters. A length of 10 is suitable for the data files provided on disc.

Finally you are asked whether you want the dialogue printed. If you answer *Y*, you will be asked to enter a description which will be printed before the actual dialogue. Now Bertha will compose a dialogue – paged mode is selected, so press Shift to see the next part if screen scrolling stops.

If, after having played with Bertha for some time, you get a *No room* error, this is probably because you have loaded new files several times. Due to the way BBC Basic allocates space to strings, it eats up a lot of memory. The remedy is to press Escape and re-run before loading new characters.

Bertha is very stimulating for creativity and dialogues on any theme can be created. Let us know if your characters come up with new scientific ideas based on a combination of old ones – not impossible with Bertha. Enjoy it!

Turn to Page 109 ▶

MORE ABOUT CREATING CHARACTERS

CREATING characters is a process in which both logic and, especially, imagination play important roles. You are not limited to two characters talking to each other. More can be created, although they need to talk about the same subjects, due to the limited number of keywords a character can be taught.

There are no strict rules to be given on how to create characters. But here's my method:

- *Write – on paper – a simple discussion between two characters.*
- *Extend it so that each has more possible responses to a statement from the other.*
- *Translate it into two lists of keywords and responses on paper.*
- *Add start lines and end lines.*
- *Work out other possible discussions and then cross-reference keywords from one character with responses from the other.*
- *Make sure most responses contain keywords the other character knows and that all start lines contain keywords.*
- *For a better discussion, some responses should contain more than one keyword.*
- *Add new keywords and responses cross-referencing until you are satisfied – still working on paper.*
- *Type in the character data into the data editor.*
- *Make the characters talk and note down the problems then go back to the data editor for improvements.*

The above method can, with a few adaptions, also be used for creating discussions involving more characters. It's interesting to see the result of a discussion between B and C if only A/B and A/C are tuned for a conversation.

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Seeing double

Mark Denby puts twice as many characters on your screen

ALTHOUGH the 80 column modes on the BBC B are very useful, they take up an enormous amount of the available ram – Mode 3 takes up 50 per cent ram and Mode 0 uses 62 per cent, not including the space needed by the MOS and DFS. Writing programs is a trade-off between program size and screen display.

But this problem could be a thing of the past with the Display Doubler. The idea is to persuade the micro to put half-size characters on to a Mode 4 or Mode 6 screen – taking 31 per cent and 25 per cent of the ram respectively. We can then have 80 columns without losing any extra memory.

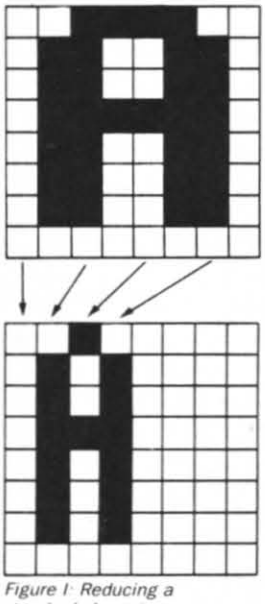

Figure I: Reducing a standard character

The program works by writing modified characters directly on to the two-colour mode screens. The routine *calculate* carries out the conversion from screen coordinates to memory address while *character* compresses the character by omitting every other column of its description.

Although this technique loses some accuracy in the character representation it's not too bad as the context usually shows what the letter should be. As most of the vertical lines in the standard BBC Micro character set are double pixel width we can halve their width without too much difficulty – Figure I shows how the characters are reduced.

Once a character has been reduced from eight pixel width to four, it only occupies one nybble – half a byte. So two characters go into one byte, part of the display routine shifts every other letter into the top nybble of the display byte, and then ORs it with what's already on the screen. Figure II illustrates what goes on.

The routine returns the final text location in the *X* and *Y* variables ready for the next display. Using the routine PROCsmall makes displaying the strings simpler – just call it specifying the screen coordinates and the text.

And there you have it, 80 character screen width in Modes 4 and 6, plus 160 across in Modes 0 and 3 – if you have a good monitor.

Turn to Page 24 ▶

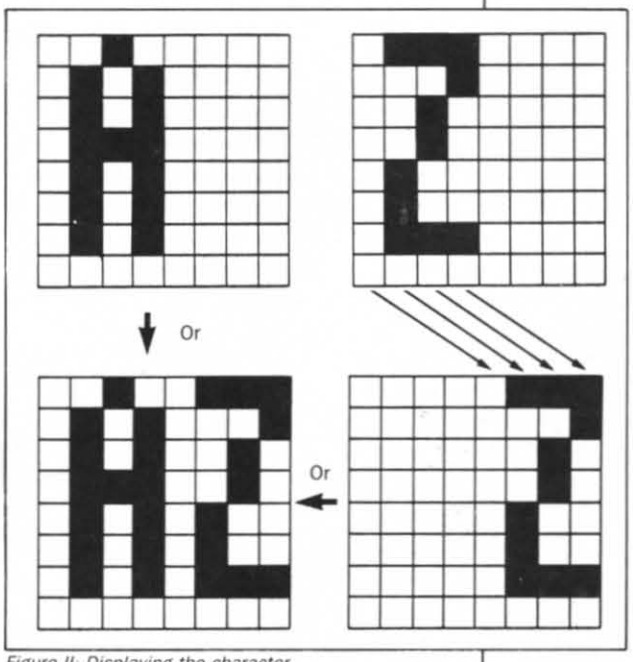

Figure II: Displaying the character

VARIABLES	
X,Y	Returned screen coordinates
osasci	Write character to VDU drivers with linefeed
osbyte	FX routine
osword	Osword routine
oswrch	Write character to VDU drivers
print	Display routine entry
start	Memory reserved for machine code
string	Display string buffer
L%	Assembly loop control
M%	Display screen mode
P%	Assembly position pointer
X%,Y%	Display location coordinates
modes$	Allowed screen modes
s$	Display string

PROCEDURES	
assemble	Creates machine code routine
small	Displays text at screen location
b	Allocates a number of bytes at an address

```
10 REM Doubler
20 REM by R.Mark Denby
30 HIMEM=&3000
40 modes$="0346"
50 PROCassemble
60 MODE6
70 VDU23,1,0;0;0;0;19,0,4;0;
80 PROCsmall(0,0,"This is now 80 char
acters across with HIMEM at &6000!")
```

◀ *From Page 23*

```
  90 REPEAT RESTORE:READ N%
 100 FOR L%=1 TO N%
 110 READ X%,Y%,s$
 120 PROCsmall(X%,Y%,s$)
 130 NEXT
 140 REPEAT M%=INSTR(modes$,GET$)
 150 UNTIL M%>0
 160 MODE VALMID$(modes$,M%,1)
 170 VDU23,1,0;0;0;0;19,0,4;0;
 180 PROCsmall(0,0,"ABCDEFGHIJKLMNOPQRS
TUVWXYZabcdefghijklmnopqrstuvwxyz1234567
890")
 190 UNTIL FALSE:END
 200 DEF PROCassemble
 210 DIM start &140
 220 FOR L%=0 TO 2 STEP 2
 230 P%=&70:[OPT L%
 240 .index OPT FNb(1)
 250 .xposn OPT FNb(1)
 260 .yposn OPT FNb(1)
 270 .max_x OPT FNb(1)
 280 .nflag OPT FNb(1)
 290 .cur_x OPT FNb(1)
 300 .cur_y OPT FNb(1)
 310 .temp1 OPT FNb(1)
 320 .temp2 OPT FNb(1)
 330 .temp3 OPT FNb(1)
 340 .point OPT FNb(2)
 350 .cchar OPT FNb(9)
 360 .charb OPT FNb(8)
 370 ]:NEXT
 380 string=&C00
 390 oswrch=&FFEE
 400 osasci=&FFE3
 410 osword=&FFF1
 420 osbyte=&FFF4
 430 FOR L%=0 TO 2 STEP 2
 440 P%=start:[OPT L%
 450 .print
 460  STX xposn:STY yposn
 470  LDA #0:STA index
 480 .ploop
 490  LDY index:LDA string,Y
 500  CMP #&0D:BEQ end
 510  LDX xposn:LDY yposn
 520  JSR character
 530  INC index:INC xposn
 540  LDA xposn:CMP max_x
 550  BNE ploop:LDA #0
 560  STA xposn:INC yposn
 570  LDA yposn:CMP #&20
 580  BNE ploop:LDA #0
 590  STA yposn:JMP ploop
 600 .end
 610  LDX xposn:LDY yposn:RTS
 620 \
 630 .character
 640  STA cchar:STX nflag
 650  JSR calculate
 660 \
 670  LDX #cchar MOD256
 680  LDY #cchar DIV256
 690  LDA #10:JSR osword
 700 \
 710  LDX #8
 720 .loop
 730  LDA #0:LDY #4
 740  STA charb-1,X
 750  LDA cchar,X
 760 .round
 770  ROL A:ROL charb-1,X
 780  ASL A:DEY:BNE round
 790  DEX:BNE loop
 800  LDA nflag:AND #1
 810  BEQ equal:LDY #0
 820 .one
 830  LDA (point),Y:AND #&F0
 840  ORA charb,Y:STA (point),Y
 850  INY:CPY #8:BNE one:RTS
 860 .equal
 870  LDY #0
 880 .two
 890  AND #15:STA (point),Y
 900  LDA charb,Y:LDX #4
 910 .rotate
 920  ASL A:DEX:BNE rotate
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron

```
 930  ORA (point),Y:STA (point),Y
 940  INY:CPY #8:BNE two:RTS
 950 .calculate
 960  LDA #0:STA point+1
 970  TXA:ROL A:ROL point+1
 980  ROL A:ROL point+1
 990  AND #&F8:STA point
1000  TYA:ASL A:ASL A:STA temp1
1010  LDA #&86:JSR osbyte
1020  STX cur_x:STY cur_y
1030  LDA #26:JSR oswrch
1040  LDA #10:JSR osasci
1050  LDA #8:JSR oswrch
1060  LDA #&86:JSR osbyte
1070  INX:TXA:ASL A:STA temp3
1080  STA max_x:LDA #0:STA temp2
1090  LDX #8
1100 .multi
1110  LSR temp3:BCC mtwo
1120  CLC:ADC temp1
1130 .mtwo
1140  ROR A:ROR temp2
1150  DEX:BNE multi
1160  TAY:LDA temp2
1170  CLC:ADC point:STA point
1180  TYA:ADC point+1:STA point+1
1190  LDA #31:JSR oswrch
1200  LDA cur_x:JSR oswrch
1210  LDA cur_y:JSR oswrch
1220  LDA #&84:JSR osbyte
1230  TXA:CLC:ADC point:STA point
1240  TYA:ADC point+1:STA point+1
1250  RTS
1260 ]:NEXT:ENDPROC
1270 DEF FNb(N%):P%=P%+N%:=L%
1280 DEF PROCsmall(X%,Y%,$string)
1290 !&60=USR(print)
1300 X=?&61:Y=?&62:ENDPROC
1310 DATA 6
1320 DATA 0,2,"To print directly onto t
he screen set X% and Y% to the position
on the screen"
1330 DATA 0,3,"Place the string at stri
ng (use <string>) and then CALL small%"
1340 DATA 0,5,"If you wish the X and Y
positons to be updated then use X and Y
to the position"
1350 DATA 0,6,"on the screen, place the
 string at string and use PROCsmall(X,Y)
. This"
1360 DATA 0,7,"will then update the X a
nd Y positions."
1370 DATA 0,9,"Enter a new mode for me
to try (0,3,4 or 6):"
```

Get it right!

10 = 0 0	240 = B957 6	470 = CF7C C	700 = 0 1	930 = 6979 2	1160 = 301D 2
20 = 0 0	250 = 2382 6	480 = 6C14 9	710 = 6B4D 2	940 = 3A29 4	1170 = EC14 E
30 = 7C44 4	260 = 8D7E D	490 = 6225 B	720 = 325 1	950 = 138E A	1180 = 8213 B
40 = 5C58 7	270 = E579 6	500 = 7D54 0	730 = 9BF0 0	960 = 560C D	1190 = A90D 5
50 = 126A D	280 = F22B 3	510 = DFE3 D	740 = 7B44 5	970 = CA86 2	1200 = 7D42 2
60 = 9ADD E	290 = AE99 9	520 = E070 9	750 = 4748 2	980 = 4A66 F	1210 = 7E37 A
70 = 63C7 A	300 = 76D0 8	530 = F2F9 5	760 = 566D 3	990 = A37E E	1220 = C3A0 C
80 = 6CA6 6	310 = CAC4 0	540 = AB41 8	770 = A33F A	1000 = F449 D	1230 = 338 3
90 = A02B C	320 = B23E 6	550 = 6B2E A	780 = 7386 1	1010 = C54A F	1240 = 8213 8
100 = 8622 C	330 = 6A77 A	560 = 1C16 6	790 = D99C F	1020 = 12BB 6	1250 = 9843 7
110 = 2D8C 3	340 = F63C 3	570 = 4F63 B	800 = A259 2	1030 = E425 4	1260 = 953B D
120 = 266F 9	350 = 36D3 F	580 = 6B2E A	810 = 1217 7	1040 = 3B91 A	1270 = 7D12 A
130 = 2C83 D	360 = 4AE1 0	590 = F12A B	820 = 3668 1	1050 = 6697 9	1280 = 2CE6 9
140 = 88E9 6	370 = DA42 0	600 = E188 D	830 = 78FE 6	1060 = C54A 6	1290 = 9476 8
150 = FDAE 7	380 = 5462 4	610 = 598D 1	840 = EB49 B	1070 = FDE 5	1300 = 9406 C
160 = EE41 8	390 = 78 7	620 = 0 1	850 = 52B5 5	1080 = C234 B	1310 = 4086 B
170 = 63C7 7	400 = AA42 0	630 = 5C1C D	860 = 1D28 7	1090 = 6B4D 8	1320 = CE85 5
180 = E45F 7	410 = 4EF9 2	640 = 1ECC 6	870 = 9CF1 A	1100 = A425 F	1330 = E199 1
190 = DADE 0	420 = 7966 1	650 = AFE2 E	880 = 9D5B 1	1110 = C78D 3	1340 = 445C 2
200 = 98A5 3	430 = AAB9 7	660 = 0 E	890 = 182B 5	1120 = A01B E	1350 = 56B5 0
210 = DB07 F	440 = DFA8 D	670 = 8BE6 A	900 = 8158 E	1130 = AF07 6	1360 = 635E 6
220 = AAB9 C	450 = 14FC D	680 = 23ED 3	910 = 32C6 0	1140 = 7807 B	1370 = F3E8 E
230 = 1BA9 5	460 = 417E 8	690 = D042 1	920 = AE74 D	1150 = 7712 0	

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Join the View club

Peter Harris shows how to use a printer easily from your word processor

I BOUGHT a Master to overcome the basic problem of the BBC Micro – it promises everything but you can't have it all at once. You can have eight colours on screen or a long Basic program in memory, but not both at the same time. The Master comes with a free View word processor, but that doesn't include the manual and printer driver program.

But once you've forked out for them you discover the limited control the driver offers. It allows View's alternative font to be either condensed or one of the foreign languages, but not both. You can't have double width or emphasised double-strike and switching to NLQ is impossible. So I became a founder member of VUPPY!, – View Uses Printers Properly, Yippee! Read on if you want to join the club...

The secret lies in the redefinition of the highlight codes. The manual suggests they should not be set less than 128, but this is an error which is in our favour. The truth is that they can be set to any value between 0 and 255, enabling us easily to generate printer commands embedded in the text.

Figure I shows how you can obtain condensed script by resetting a highlight code to 15. In this, and all succeeding examples, we assume you are using an Epson-compatible printer that supports reverse paper feed and, in the figures, an underscore character represents a highlight 1 and an asterisk represents a highlight 2.

The printout from Figure I is shown in Example I. It is worth noting that text which is placed after the parameters on the HT lines is ignored when printing, making this a useful place to store comments. The same is true of some other stored commands.

The most useful redefinition is to set one of the

```
HT 1 15 Set condensed        (HT is a stored command via Shift+f8 )
HT 2 18 cancel condensed
   _Now, after input of a highlight 1 code, the printer
   switches to condensed.
   *After the highlight 2 code, the printer returns to
   normal script.
```

Figure I: Switching to condensed

```
HT 2 27 Use highlight 2 as ESC
   *ESet emphasised (bold) mode.  *FCancel emphasised
   *GSet double-strike.   *HCancel double-strike
   *W1Set enlarged.   *W0Cancel enlarged
   *>Set italics.   *=Cancel italics
   *p1The quick brown fox jumps over the lazy dog (proportionally)
   *p0The quick brown fox jumps over the lazy dog (normally)
   *MA word or two of Elite,*(some NLQ, *Pand back to pica
   And now for *S0superscript*T,normal,*S1subscript*T, and back to normal
   *-1underlined on.*-0  Underlined off
```

Figure II: Using highlight code 2 as ESC

```
HT 2 27
HT 1 0 Selection of international character sets - USA
   *R_# $ @ [ \ ] ^ £ { | } ~ USA
HT 1 1 Selection of international character sets - France
   *R_# $ @ [ \ ] ^ £ { | } ~ France
HT 1 2 Selection of international character sets - Germany
   *R_# $ @ [ \ ] ^ £ { | } ~ Germany
HT 1 3 Selection of international character sets - UK
   *R_# $ @ [ \ ] ^ £ { | } ~ UK
HT 1 4 Selection of international character sets - Denmark
   *R_# $ @ [ \ ] ^ £ { | } ~ Denmark
HT 1 5 Selection of international character sets - Sweden
   *R_# $ @ [ \ ] ^ £ { | } ~ Sweden
HT 1 6 Selection of international character sets - Italy
   *R_# $ @ [ \ ] ^ £ { | } ~ Italy
HT 1 7 Selection of international character sets - Spain
   *R_# $ @ [ \ ] ^ £ { | } ~ Spain
HT 1 8 Selection of international character sets - Japan
   *R_# $ @ [ \ ] ^ £ { | } ~ Japan
```

Figure III: The international character sets

```
HT 2 27
HT 1 8   Printing mixed fractions with HT 1 as backspace

   3*j_*j_*-15*-0*J_*J_*J_*J__8*j_*j_ + 4*j_*j_*-1 3*-0*J_*J_*J_*J___16*j_
   *j_ = 7*j_*j_*-113*-0*J_*J_*J_*J___16*j_*j_
```

Figure IV: Outputting mixed fractions from View

```
*b.
AUTO 1000
REM VUPPY Printer Driver VPDt5
oswrchr=&FFEE
FOR Opt%=0 TO 3 STEP 3
P%=&400
[OPT Opt%
JMP prchar
JMP pron
JMP proff
RTS:NOP:NOP
RTS
.prchar PHA
CMP #13
BNE pr1
LDA #1
JSR oswrchr
LDA #10
JSR oswrchr
.pr1 LDA #1
JSR oswrchr
PLA
.oswr JMP oswrchr
.pron LDA #2
BNE oswr
.proff LDA #3
BNE oswr
]:NEXT
*save VPD 400 440
```

The printer driver program

highlights to 27 – the ESC value – as this gives us access to virtually all the printer functions. Figure II shows that all the listed features may be achieved by inserting a highlight 2 – redefined to 27 – followed by a single or two-character code which signals the printer to change mode and does not itself get printed. Note that the codes for underline switching are hyphen characters, not underscores or highlight 1.

This principle is always applicable, but unfortunately some of the required codes are non-printing characters. They are therefore not accepted by View for incorporation into the text. However, we can get round this by redefining the other highlight as shown in Figure III, which outputs the international character sets.

Now let's move on to some more advanced ideas. The conventional way of printing mixed fractions from View is to print the integer, go into superscript for the numerator, return to normal to print a slash character and move to subscript for the denominator. This spreads the figures across the page, and the super and subscript are not easily legible unless you switch to condensed – which is where we came in.

Furthermore, the printer ignores super and subscript commands in NLQ mode. An apparently more complicated, but visually more satisfactory method – which can equally well be used with NLQ – is shown in Figure IV. Highlight 1 is redefined to 8 and is used not only on its own as a backspace character but also as a counter for the printer's forward and reverse paper feed. The sequence of events starts with:

```
print a 3
move up half a line (*j_*j_)
start underline (*_1)
print a 5
cancel underline (*_0)
move down a line (*J_*J_*J_*J_)
backspace once
print an 8
move up half a line
```

By now you may be wondering if you need to buy the printer driver at all. The good news is that you don't if you type in the listing. It is in the form of View text which can be saved in the usual way and when you *EXEC it a Basic assembly program is set up. When this is run it leaves a printer driver routine sitting at &400, and saves it to disc under the filename VPD.

This can then be used as the driver for your next View session. It works well, although it is a little cumbersome at times by comparison with the official View printer codes, and it would perhaps be treated with suspicion by a typist accustomed to them.

There are difficulties with the £ sign – printed by the # character from the UK character set – and the automatic formatting will fail because of

Turn to Page 28 ▶

View's own printer driver allows the alternative font to be either condensed or one of the foreign languages but not both

Example I *Switching to condensed*

```
Now, after input of a highlight 1 code, the printer
switches to condensed.
After the highlight 2 code, the printer returns to
normal script.
```

Example II *Using highlight code 2 as ESC*

```
Set emphasised (bold) mode.  Cancel emphasised
Set double-strike.   Cancel double-strike
Set enlarged.        Cancel enlarged
Set italics.   Cancel italics
The quick brown fox jumps over the lazy dog (proportionally)
The quick brown fox jumps over the lazy dog (normally)
A word or two of Elite, some NLQ, and back to pica
And now for superscript, normal, subscript, and back to normal
underlined on.  Underlined off
```

Example III *The international character set*

```
# $ @ [ \ ] ^ ` { | } ~ USA
# $ à ° ç § ^ ` é ù è ¨ France
# $ § Ä Ö Ü ^ ` ä ö ü ß Germany
£ $ @ [ \ ] ^ ` { | } ~ UK
# $ @ Æ Ø Å ^ ` æ ø å ~ Denmark
# ¤ É Ä Ö Å Ü é ä ö å ü Sweden
# $ @ ° \ é ^ ù à ò è ì Italy
₧ $ @ ¡ Ñ ¿ ^ ` ¨ ñ } ~ Spain
# $ @ [ ¥ ] ^ ` { | } ~ Japan
```

Example IV *Outputting mixed fractions*

$$3\frac{5}{8} + 4\frac{3}{16} = 7\frac{13}{16}$$

◀ *From Page 27*

the extra character codes. The best way is to use these techniques to extend the facilities available from the proper printer driver.

Finally, hands up all those of you who think you can't get a two-column printout from View. It can be done as follows:

● Adjust the ruler to format to a width of 38 characters.

> Reverse feed the paper by *N* half-lines, where *N* is a large number, using the same principal as in Figure IV:
> HT 2 27
> HT 1 28 This value is a true half-line
> *j– (repeated N times, with as many on one line as possible)
> Set the printer left margin to the 40th character position – the (character has an Ascii value of 40 so use:
> *I(Note that this command should be on the same line as the preceding ones, but they have been separated for clarity.

The printer commands in the macro

● Use the SCREEN command to display the text and note the positions of the page breaks.

● At the position of the first page break, call a macro containing the printer commands shown in the panel.

● At the second page break, call another macro to reset the left margin to the extreme left:

HT 1 0
*I–

● Repeat the third and fourth steps for succeeding page breaks.

● Reset the page length with the PL stored command. The exact value for this, as well as that of *N* in the third section, depends on experiment as well as calculation. My usual page layout assumes the normal fanfold paper length of 11in and eliminates the blank lines at the top of the page with the stored commands:

HM 0
TM 0

Under these circumstances appropriate values are 118 for *N* – with the reverse feed commands spread over four lines – and 124 for the PL stored command.

● Save the text version with a different filename in case of problems.

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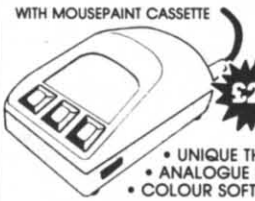

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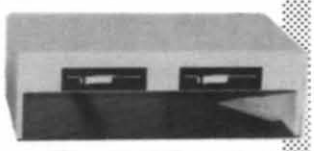

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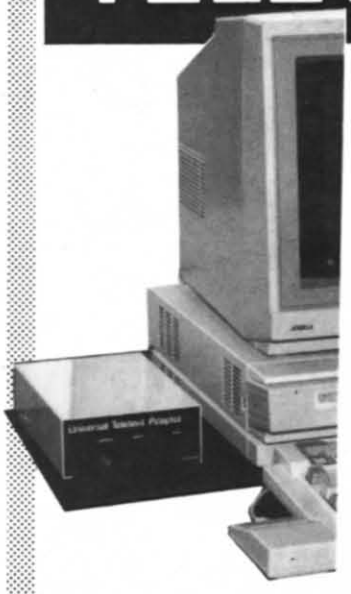

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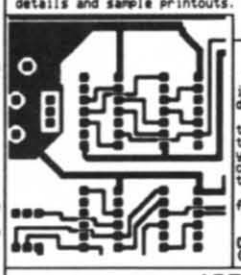

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SOFTWARE SCENE

Breakthrough ... reaching new levels

Price: £9.95 (cassette), £11.95 (disc)
Supplier: ASL, Winchester House, Canning Road, Weeldstone, Harrow HA3 7SJ.
Tel: 01-861 1166

I ALWAYS think that playability is the most important feature that a game can have. The sound may be poor and the graphics crude or small, but if it's playable I'll keep coming back. Also, with a few notable exceptions – such as Elite – simple ideas often make the best games. Breakthrough from Audiogenic is one game that can be described in this way.

Although the title makes it sound like another Breakout/Arkanoid/Impact bat n ball clone, Breakthrough is totally different. It is basically a 100-screen platform game – similar to Manic Miner or Magic Mushrooms – in which you play a little wizard who looks a bit like the central character of Wizadore. Navigate your way around each screen, avoiding fireballs, vampire bats and various other nasties, collect a key then jump through an open door. It's simple.

The controls are equally easy: Left, right, jump and create or destroy a block. This last feature is the key to the whole game: By destroying existing blocks and creating new ones you can change the whole layout of the screens to allow you to get to previously inaccessible sections.

Certain types of blocks cannot be destroyed and these are

invariably positioned awkwardly just to make things difficult. When used in conjunction with fireballs and the other lethal features they can produce some very tricky screens. However, there are certain compensations: Some blocks contain hidden goodies that can give you bonus points, extra lives or halve the speed of the countdown timer – very useful.

The 100 screens are sequential, not linked as in arcade-adventure games such as Citadel. However, a useful screen-skip system is provided so that you do not have to start from the first every time.

Every five screens you are presented with a new password which can subsequently be used to gain access to any one of the next five. Although I found that my right hand kept slipping from the Shift – jump – key to : which is most normally used for upward movement my only real gripe is with the left-right movement: You can create or destroy a block immediately in front of you so you often need to turn around to face the correct way.

However, it is very difficult just to rotate without moving one square in the opposite direction. On later screens, where you must sometimes stand immediately next to a fireball or almost directly under a vampire bat, an inadvertent overstep can prove fatal.

This is certainly an engrossing game – extremely addictive because of its simplicity. The graphics are rather small compared to those in many of the other games on the market nowadays, but don't let that put you off. In general Breakthrough is not too hard and strikes me as being an effective way to encourage children to think logically. But it's also good enough to keep me playing it.

Hac Man

Sound	7
Graphics	6
Playability	8
Value for money	8
Overall	8

Shark ... A real killer

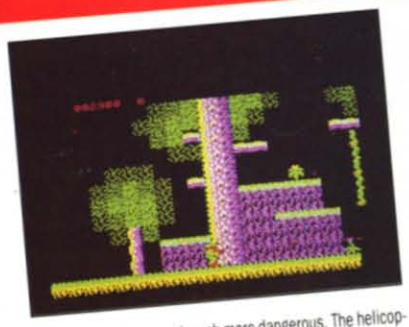
Price: £9.95 (cassette), £11.95 (disc)
Supplier: ASL, Winchester House, Canning Road, Weeldstone, Harrow HA3 7SJ.
Tel: 01-861 1166

SHARK is one of two new titles from Audiogenic, the first all year. The scenario is typical – the bad guys have invaded in force and you, Colonel Shark, are the only hope. A tough assignment, but you'll have to handle it.

It turns out to be a sideways-scrolling wargame very much in the mould of Green Beret. As in that, you can jump around the screen so that one moment you may be running along the ground and the next running along a girder.

There are a number of sections: Jungle, barrack square, town streets and more. Each sector is immediately distinctive: In the jungle one you can run along the ground and through clearings, and jump up on to giant blocks of stone and tree branches. In town you can jump on to window ledges, the roofs of houses and so on. Clever use of dithering – mixing the colours of adjacent pixels to give the appearance of new ones – adds to the overall effect.

You certainly need to keep on the move as an endless stream of foot soldiers bear down on you. Luckily your rifle makes short work of them. However, the trucks and helicop-



ters are more robust and much more dangerous. The helicopters appear in the sky and home in on you, dropping bombs all the time. The trucks drive at you showering bombs your way.

You must shoot both helicopters and trucks several times before they burst into flames, but the danger does not stop there – you now have to contend with an armed and understandably irritated pilot or driver charging you on foot. Contact with anything that moves is fatal.

However, some useful bonuses are on offer if you can get to them. Killing certain foot soldiers lets you retrieve their backpacks: Collect them to find a machine gun, extra lives, temporary invulnerability or other goodies.

The game features some nice touches: Your one-man quest is accompanied by some catchy interrupt-driven music, but you can also slaughter in silence. The playing keys can be redefined and the colour schemes altered to make viewing easier if you are using a monochrome display. The pause/restart, quit, and sound on/off options are all present and correct.

One drawback lets the game down: The lack of accuracy in detecting collisions. Many a time I have sidestepped an enemy soldier or seen a bomb land well short of me only to find myself disappearing in a puff of red smoke. It is an irritating flaw in an otherwise enjoyable game.

Shark is a simple and bracing shoot-anything-that-moves. It's a little too similar to Green Beret to appeal to anyone who already has that, but Colonel Shark will certainly win his share of devotees, especially among those seeking a hero to inherit the mantle of Commander Stryker.

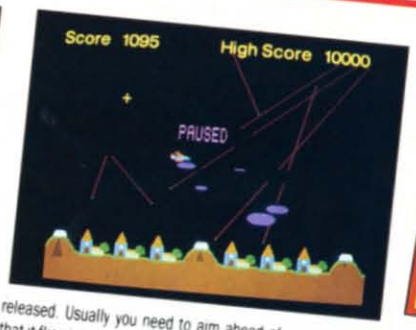
Hac Man

Sound	8
Graphics	7
Playability	7
Value for money	7
Overall	7

SOFTWARE SCENE

Missile Control ... three minute warning

Price: £14.95
Supplier: Minerva, 69a Sidwell Street, Exeter, Devon EX4 6PH.
Tel: 0392 37756



THIS is the second offering from Minerva and is a straight zap-em type game based on the old arcade favourite Missile Command. There is effective use of the mouse to target the enemy – the original used a track-ball.

The scenario is simple: You have six cities – each represented by a church – to protect from nuclear attack. For defence there are three bases from which you can fire missiles to a position set by sighting the on-screen crosshairs.

Each mouse button corresponds to one base and you have to wipe out the incoming missiles the enemy have fired at your cities. This method of play certainly takes the strain off your keyboard and, if you play for any time, you'll benefit from a mouse mat.

Later in the game you get a chance to knock out planes and satellites carrying fresh missile clusters before they are released. Usually you need to aim ahead of your target so that it flies into your explosive cloud, rather than aim to score a direct hit. However, just as you start to become complacent, you find yourself up against smart missiles which dodge.

Although the somewhat sparse graphics are smooth and the explosions quite artistic there's not much variety. Also there is very little by way of sound, and this sort of game really needs it. I can't see anything original about this and I think you could get bored with it quite quickly.

Terry Blunt

Sound	3
Graphics	3
Playability	4
Value for money	3
Overall	4

Repton Thru Time ... the jolly green lizard

Price: £9.95 (cassette) £11.95 (disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453

WELL, our little green friend is back again in a new set of 40 screens. Repton Thru Time covers various periods of history ranging from Prehistoric and Egyptian through Victorian, and stretches into the present day and up to Future.

All the screens are Repton 3 standard and will load into any version – but you get the game and screen designer as usual, so if you haven't got any of the earlier versions you don't need to worry.

You start up with the Prehistory screen set where Repton is wearing an animal skin and searching for the ultimate invention – the wheel. On his way he eats the green berries and avoids the red ones, the monsters are reptiles – dinosaurs – and need crushing by the unaltered boulders.

Spirits have become pterodactyls and seek out their caves before turning into berries. The first screen was nice and easy, reminding you gently of all the usual Repton tricks – but don't make any mistakes because you can only get out of the start area once before it gets blocked.

Repton moves next into the Egyptian period with very brightly designed characters. The first screen has an original start with two wicker baskets at either side of Repton falling and opening to reveal serpents – it certainly grabs your attention. The spirits are now mummies seeking out their tombs. The rest of the screens are occupied by pyramids, scorpions and the scrolls that you need to collect.

The next set of screens cover the Victorian era. The character designs are less clear with Repton in a frock-coat and most of the supporting blocks being gaslights. There's a little social comment since the creeping fungus is represented by smoking factories. But again there's a nice easy run at first with a good stiff gradient as the screens progress.

There's another tricky start in the present day screen set. The usual Repton key is represented by the Excess card – are two next to where you start. There are no diamonds – cans of coke – available and no boulders – suitcases – to shift. All you can do is take the cards, but take a really good look at the map before you do.

The final set of screens is called Future and they are hard. Empty spaces and earth are now stars whereas skulls and fungus are nothing – called black holes. Not only that, but time capsules look like teleports and are called time warps. All I can say is that the mind of the designer must be warped too.

The first screen of this set would be easy if the characters were anywhere near normal – but as it was it took me ages to finish. Pushing around the robots was easy enough, but you can't tell at a glance how they are being supported. Out of crashed spaceships come the BEMs – bug-eyed monsters – and spirits are a different type of alien which convert Tie-fighters into crystals and if you grab a laser gun the Daleks get changed too.

This Repton group of screens is reputed to be the last that's going to be produced – I wonder...

Steve Turnbull

Sound	7
Graphics	8
Playability	9
Value for money	8
Overall	8

Return to Doom ... there and back again

Price: £12.95 (disc only)
Supplier: Topologika, PO Box 39, Stilton, Peterborough PE7 3RL.
Tel: 0733 244682

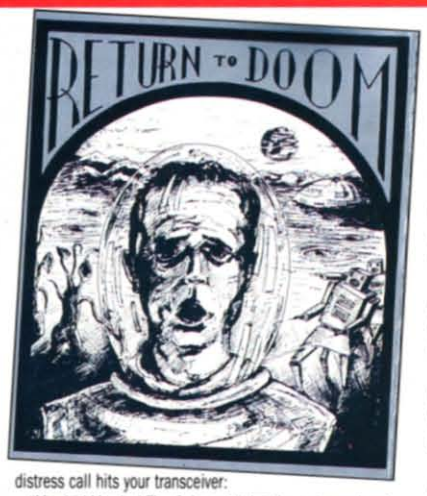
RECEIVING a package from certain software houses always sets my pulse racing, and I invariably have to stop what I'm doing so that I can make a preliminary inspection of the goodies – *early evaluation* is what I kid myself I'm doing.

Peter Killworth adventures get better all the time, and the degree of sophistication shown in the parser in Return to Doom is in telling contrast to that of the lamentable **Not a Penny More, Not a Penny Less** reviewed last month. Specimen commands include *Go North, then eat the pig, E, SW, IN* or *Get all but the duck and goblet, and leave.*

You will normally receive a full location description on your first visit and an abbreviated one subsequently – such a help in mapping – but if you enter the command *Verbose* you always receive a full description.

I notice that the BBC Micro implementation has been done by Jon (Acheton) Thackray. There is the usual excellent back-up in the form of on-line help from the disc itself, prompted by the problems indicated on the back of the inlay. And if *these* aren't enough you can send a SAE to Topologika with full details of your problem and proof of purchase.

Booting the disc reveals the story: You are flying through the universe, minding your own business, when a desperate



distress call hits your transceiver:

"Mayday! Mayday! The *Galapoxi* taking the ambassador of Regina on an important mission to Fluxo, has just crashed on Doom! Ship disintegrating fast!

"We have left the ship for safety – there are only three of us, plus the ambassador, left alive. Rescue needed imminently. Please hurry...heading for cleft..."

Return to Doom is a big adventure, full of the amusing touches you expect from Peter Killworth. Your task is straightforward enough: Find and rescue the ambassador before she gets turned into a robot.

However, as you might expect, completing the task successfully is not straightforward at all. Once you have left your ship you find yourself in a jungle and you'll have to jump to it smartly if you are to avoid being mumbled to death.

A little further on, you can gain entry through a closed door by means far more conventional than merely uttering *Open Sesame* – but when you do – you'll find further problems down below.

The fact that I was once seen emptying saucepans full of *nothing* out of the bilges of a yacht by pouring them over the side may be an indication of the solution rather than my lack of sanity.

There are plenty of excellent descriptions and the text is larded with clues that help the careful player to work out how to proceed. This means that you needn't *examine* everything you come across, but don't ignore this command entirely.

Return to Doom has got to be the major contender for Adventure of the Year, so far as 1988 is concerned.

Mad Hatter

Atmosphere	9
Complexity	9
Presentation	9
Value for Money	10
Overall	9

Hoverbod ... a case of levitation

Price: £14.95
Supplier: Minerva, 69a Sidwell Street, Exeter, Devon EX4 6PH.
Tel: 0392 37756

HOVERBOD and Missile Control (see opposite) are two new releases for the Archimedes and the usual Shift+Break loads them into your machine. Both reconfigure the system settings as they load but restore them when you exit – so don't just switch off.

Hoverbod is an arcade adventure, and fairly typical of the genre. You have to guide your somewhat bemused droid around eight planets collecting red diamonds. The Ibbles and Squibbles will make life difficult but there's an interesting array of weapons you can fetch to use against them.

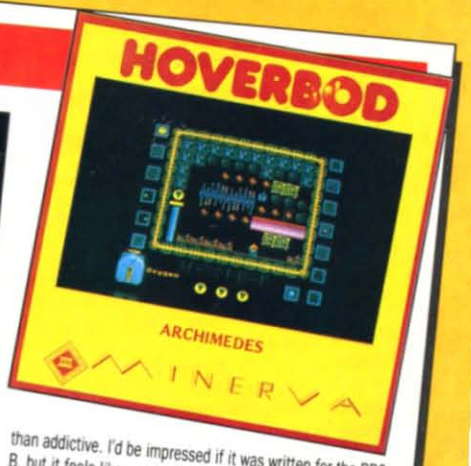
Hoverbod himself looks quite cute, and the Squibbles hardly look threatening at all – until they nab you. Hang about too long and you'll be zonked by what looks like a cross between a stork and a dodo.

There are the obligatory lethal spikes that you have to avoid, but if you can find it there's the spike inverter to make them safe. As well as a pause facility – which I strongly

advise you to use when moving into a new screen – there is a password system to let you get straight back to the level you just died in.

The graphics are quite detailed and free from flicker but, suprisingly for an Archimedes game, they're jerky in places. Although you'll hardly ever hear the sound of Hoverbod bouncing, unless you connect up your hi-fi, there's enough volume to let you know when something's happened and – oh joy – no idiot tune.

The game has some neat twists and is enjoyable rather



than addictive. I'd be impressed if it was written for the BBC B, but it feels like a quick conversion from an 8 bit micro.

Terry Blunt

Sound	5
Graphics	6
Playability	5
Value for money	4
Overall	6

SOFTWARE SCENE

HEAD COACH V3 ... a change from Channel 4

Price: £13.95 (disc)
Supplier: Coda Software, 4 St Simon's Avenue, London SW15 6DU.
Tel: 01-789 9551

AMERICAN Football has grown in popularity in Britain over the last few years due to the TV coverage on Channel 4. So it was inevitable that someone would produce a simulation for the BBC Micro. Coda Software has done the job neatly with Head Coach v3.

The game places you in charge of the Schoburg Franklins, the newest team in the NFL, and your job as head coach is to guide your team to success, and hopefully a place in the Superbowl final at the end of the season. If you don't make too much of a hash of it, you get to keep your job, draft in some new players and try to improve the team's performance for next season.

A nice feature is that after playing you can save your current position and all relevant statistics on your team. So next time you play you start from where you left off.

When starting a new run you are presented with a list of the 28 existing teams which make up the NFL and are asked to choose which team you wish Scoburg to replace in the league. If you choose a strong team like Washington or Chicago your fixtures are going to be tough. It's better to choose a less successful one, like Atlanta.

From there you move to the team headquarters menu which has 21 options. A to Q give you statistics on your team and its performance during the season. Most of them are blank when you first start the game. Option R prints up another menu called Training Camp where you can test your players using a speed trial to discover how fit they are or you can get assessments of the players' performances during training. This allows you to make your choice of the team you want to play in the next match.

On returning to the Team Headquarters menu you can select option S which starts your next match. Each season comprises two pre-season matches followed by the 16 games which make up the regular season. If you qualify you get to take part in the play-offs aiming for a place in the Superbowl.

Each match is preceded by a short profile of your opposition after which you can make last minute changes to your team. A match lasts for four quarters, each taking about five minutes to play through.

While the match is in progress you can select the type of attacking and defensive plays for your team. The micro does the same for the opposition. This is fine if you know a fair bit about American Football but if not you could run into serious problems. The best thing to do before playing is to study the neat rule book which accompanies the software.

Between each quarter, you can view all the statistics on the game and change your team members if you think they are not doing too well.

Once the match ends, you are given a report by your team doctor on injuries sustained. Then you are informed of who your three most valuable players were during the match, plus the results of the other games played and your league placing. Finally you are returned to Team Headquarters to prepare for the next match. The trouble with this game is that

you can get bogged down in a sea of statistics while preparing for each match, and then once the matches start you can get to a point when you begin to wonder if player assessments and team selections make the slightest difference to whether you win or not.

I found it could be totally frustrating when I selected my strongest team, according to the statistics, to be thrashed by San Diego, who hadn't won a single match until then.

On the whole though, I found the game fascinating and good fun – excellent for bringing out the emotions. There aren't many games around that have reduced me to shouting at the screen.

Desmond

Sound	6
Graphics (mostly text)	8
Playability	6
Value for money	8
Overall	8

AMERICAN SUDS ... laugh along with soap

Price: £4.00
Supplier: Riverdale Software, 95 Printon Avenue, Manchester M9 3JW.
Tel: 061-795 4549

HOT on the heels of Suds – reviewed in the November 1987 issue of *The Micro User* – comes the sequel, entitled oddly enough, American Suds.

Buffs of Dynasty, Dallas, Hill Street Blues and the rest, will find all their favourite characters, albeit in a slightly disguised form. Only the names have been changed to protect the guilty. This must be the spoof to out-spoof all spoofs.

You begin this four-part adventure on the concourse of a major British airport and soon realise that you are reliving part of Mel Brookes' hilarious Airplane. An airline pilot wanders by, muttering: "My name is not Shirley."

Once you have mustered a variety of artifacts, discovered the amusing password to the computer and collected your boarding pass you can begin the adventure in earnest. Providing, of course, that you survive the customs.

Once aboard the aircraft you may wish you had never bothered, as the gags come thick and fast. The humour is sick at its worst and at times outrageous. A tube of rubber solution, a spanner and a silk sheet are all you need to leave this flying death-trap, but it will take some experimentation and head-scratching to work out how to escape.

You must sign a contract in blood and step back in fashion if you wish to progress to part two and star alongside J.R (Just Revolting) in the new series of Dullus.

In the remainder of this laughalong type-in you will meet Captain Gorilla of the Kill Street precinct and discover that smoking really is good for you.

I found getting into the shed to be the most perplexing problem of the entire game. I eventually became enlightened to the fact that a nihilist approach to examination was most rewarding.

The funniest sketch has to be that involving the mice and the Pie Wiper of Hamelin, but I'll leave you to unearth the true humour for yourself. My one and only criticism is that the adventure was written using The Quill. All the usual limitations of parser input and room description apply here, as they do in other Quilled games. However, this adventure succeeds on every other score and will keep you in stitches for many hours.

Author David Edwards is fast becoming the unchallenged master of this genre of text adventures. I rate American Suds as more polished and funnier than anything from the Melbourne House stable and only perhaps equalled by Magus's majestic Locks of Luck and Riverdale's own Suds.

Pendragon

Presentation	7
Atmosphere	7
Frustration factor	9
Value for money	10
Overall	9

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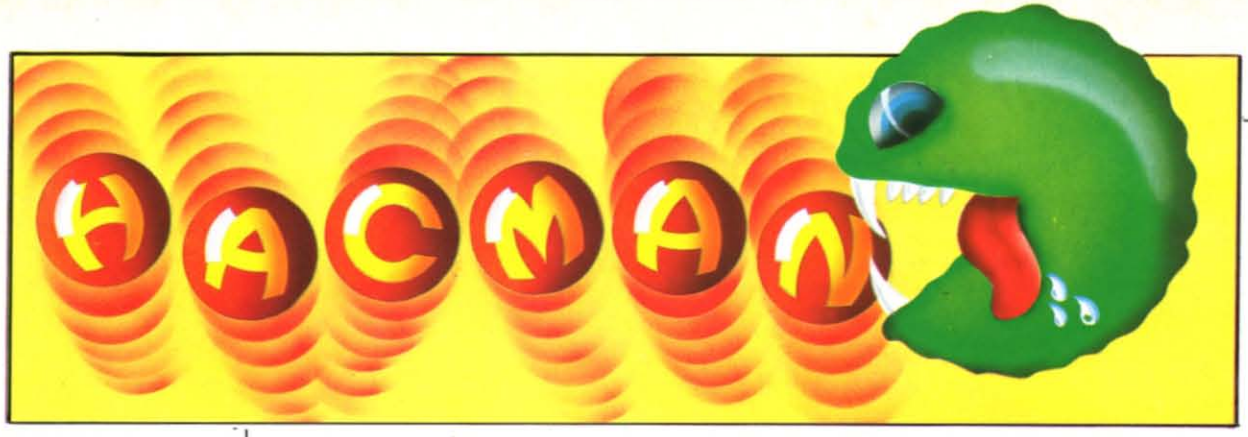

B B+ M Jack

Featuring

Vegas Jackpot
Spy vs Spy
Superman
Kourtyard
Arkanoid
Citadel
Impact

Something for everyone

Hac Man presents another selection of modifications for your favourite games

THIS month's column is a nice mix of goodies that should have something for everyone – pokes, cheat modes, conversions and more besides. Before we start, however, the subject of a number of the letters in my latest postbag forces me to stress once again a number of points.

Under normal circumstances, before anything gets into my column I test it thoroughly with an original cassette or disc version of the game in question. However, it's a long road from my micro to the printed page and mistakes do sometimes get in – I try to deal with them as soon as they're spotted.

Very occasionally I will feature something that I have not been able to test – normally because of hardware constraints. These include a couple of routines to allow Master versions of games to run on a BBC B with the Solidisk FourMeg 256k sideways ram board. In cases such as these – where I do not have access to the add-on – my only options are either to print them in good faith or not to print them at all.

There is often more than one version of a game – for example, the original cassette and disc versions of Citadel and the Play It Again Sam issues are all different. I always try to make clear which version I am referring to, because pokes or upgrades for one version rarely work on another.

Never save any routine on to the original tape or disc. Discs in particular often have hidden data which can be easily overwritten by any additional programs introduced to them. Most commercial programs have a write-protect tab on the disc and the write-enable lugs removed from the cassette to make it difficult to damage them by mistake. But do not expect to be able to get a replacement if you insist on deliberately overwriting originals.

In the July column I mentioned that Tynesoft had a few big titles coming soon, but that I wasn't allowed to give any details. I've now got confirmation that one of the games is based on the comic strip character **Superman**, 50 years old this year.

Some readers may know of a Superman game released a few years ago for a number of other machines: It turned out to be one of the biggest let-downs the software industry has ever seen. Fortunately Tynesoft's implementation has nothing to do with that game, and I hope none of the stigma of that original disaster will be attached to this new release.

The details are still very sketchy, but the scenario is being written by the staff writers at DC Comics – publishers of Superman – so it should be good. The BBC Micro version is being programmed by Kevin Blake of Spy vs Spy and Indoor Sports fame. Expect it much later in the year.

The long-term popularity of **Citadel** never ceases to amaze me. Although it was first

Living longer

Simon Burnand of Bicester, Oxon, has sent me an infinite lives poke for the cassette version of **Arkanoid**. Enter Program I and run it. Then type:

```
PAGE=&E00
CHAIN"
```

to load the game as normal.

```
10 REM Arkanoid infinite lives
20 REM by Simon Burnand
30 REM (C) The Micro User
40 :
50 P%=&9C0:[ PHP : PHA
60 LDA# &EA : STA &171C : STA &171D
70 PLA : PLP : JMP !&220
80 ] : ?&220=&C0:?&221=9
90 *TAPE
```

Program I: Arkanoid infinite lives

released over two and a half years ago, I regularly receive letters from as far afield as Norway asking for help with the game.

I count Citadel as one of my own all-time favourites, so I may well be doing a full feature on it in the not too distant future. In the meantime, however, Programs II and III are a couple of infinite energy routines for the **Play It Again Sam** versions. They should help those with less nimble fingers. However, they won't make all the problems go away – you still have to do a lot of thinking about them.

On the same subject, C. Jeffrey of Warrington, Cheshire has written in with news of an extraordinary feature of Citadel that would almost certainly never be found under normal circumstances. Take a trampoline all the way to the ocean on the extreme right-hand edge of the Citadel map – grid reference 18,0 – and drop it on the pad. Then jump up and down on it and, in Mr Jeffrey's own words, "Above the ocean, a little to the left, lies a very big surprise".

A striking cheat

Impact from Audiogenic – the last game from Gary Partis before his premature retirement – also features a built-in cheat mode. This will be of no surprise to anyone who knows any of Gary's earlier works. When the high-score table is being displayed press Shift+Escape: This brings up a hidden message, and sets the mode in operation.

Now, when you play the game, you will find that the logo *Partis 1987* in the top right-hand corner of the screen has changed to *Cheat 1987*. Press *J* to jump from one level to the next, *G* to get a free token or Control to lose a life.

When you're on the high-score table, press *D* to force a demo or *L* to reveal a list of all 80 frame codes to be used with the screen editor. The game resets itself to normal mode when you return to the high score table, so just repeat the Shift+Escape procedure.

No joy

David Anthony of New Barnet, Herts has pointed out that in the review of Tynesoft's **Spy vs Spy** in the December 1987 issue it was mentioned that you could control the spies using joysticks. But David cannot work out how to select this option.

Unfortunately this is because the game only allows keyboard control. We're sorry if the review caused confusion. From a personal point of view, I almost invariably play games using the keyboard – I find it a lot more accurate than a joystick.

Energy bars

D. Whitelow of Ashton, Bristol, would like to know what the *blue blocks* are used for in **Citadel**. They are actually iron bars – take them to Stonehenge where they will disappear and give you extra energy.

Also in Citadel, Pak Charoenkul of Chelsea cannot get past the wolf guardian in the temple on the island. It will only let you past if you offer it something – other than yourself – to eat. Take the chicken from the freezer and drop it on the pedestal in the kitchen. Wait for the flames in the fireplace to pass through it, then pick it up again. You will find that you now have a cooked chicken and if you take this to the temple the wolf guardian will never bother you again.

```
   10 REM Citadel infinite energy
   20 REM BBC tape Play It Again Sam
version
   30 REM by Hac-Man 1988
   40 REM (C) The Micro User
   50 FOR I%=0 TO 2 STEP 2:P%=&900:[O
PT I%
   60 JSR &A00 : LDA# 0 : STA &5461 :
 LDA# &4C : STA &547C : JSR &5436
   70 LDA# 0 : STA &3B26 : STA &3BF0
: STA &4EBF : STA &52A2 : LDA# &EA :
STA &38D1 : STA &38D2 : STA &38D3 : L
DA# &A5 : STA &38D4 : \ infinite ener
gy
   80 JMP &54AA
   90 ]:NEXT:*FX 15,0
  100 *KEY0 LOAD"CITADEL"|M 8300 CALL
&900|M RUN|M
  110 PRINT"Please insert Sam tape an
d hit a key...":A%=GET
  120 PROCload:*FX 138,0,128
  130 END
  140
  150 DEFPROCload
  160 !&A00=&208D27A9:!&A04=&8D0AA902
  170 !&A08=&0EA90221:!&A0C=&F42004A2
  180 !&A10=&A01FA2FF:!&A14=&FFF7200A
  190 !&A18=&04A20DA9:!&A1C=&4CFFF44C
  200 !&A20=&5449432E:!&A24=&080D4C41
  210 !&A28=&98488A48:!&A2C=&03CAAD48
  220 !&A30=&CA8DFE29:!&A34=&68A86803
  230 !&A38=&602868AA:!&A3C=&21434148
  240 ENDPROC
```

Program II: Citadel infinite energy – Sam tape

```
   10 REM Citadel infinite energy
   20 REM BBC disc Play It Again Sam ver
sion
   30 REM by Hac-Man 1988
   40 REM (C) The Micro User
   50 FOR I%=0 TO 2 STEP 2:P%=&900:[OPT
I%
   60 LDA# 96 : STA 2713 : JSR &A00
   70 LDA# 0 : STA &4126 : STA &41F0 : S
TA &54BF : STA &58A2 : LDA# &EA : STA &3
ED1 : STA &3ED2 : STA &3ED3 : LDA# &A5 :
 STA &3ED4 : \ infinite energy
   80 JMP &5E00
   90 ]:NEXT:*FX 15,0
  100 *KEY0 *LOAD CITADEL|M PAGE=&1900|M
 END|M OLD|M 380 *LOAD CITAX|M 390 CALL
&900|M RUN|F|M
  110 PRINT"Please insert Sam disc, side
 1, and hit a key...";:A%=GET
  115 *INIT
  120 VDU 21:*FX 138,0,128
```

Program III: Citadel infinite energy – Sam disc

Kourtyard effects

Earlier this year I went to London to attend the launch of Go-Dax and subsequently reviewed both Skirmish and **Kourtyard** – the two games being released on the day. I have since received a letter from Mark Rogers, the author of Kourtyard, giving details of a comprehensive cheat-mode built into the game.

Load the program as normal and press the Shift and – keys together, in effect type £. The micro

Turn to Page 38 ▶

◀ *From Page 37*

will then print the word CHEAT in the bottom left-hand corner of the screen. You now find that function keys f0 to f4 have a variety of special effects, as shown below:

f0	Loads the next level from tape or disc
f1	Gives you infinite arrows
f2	Gives you infinite lives
f3	Removes all the *baddies*
f4	Allows you to practice on the bonus screen that normally only appears between one level and the next

The map editor also has some undocumented features, all activated by pressing the appropriate keys when the title page is being displayed. The numbers 0, 1, 2 and 3 set the *safe trap door direction* – the only direction in which it is safe to walk over all the trap doors on that level as follows:

0	West-East
1	East-West
2	South-North
3	North-South

The editor also allows you to to set a *cannon flag*. If set, all landscape features corresponding to editor character F will fire streams of cannon-balls. Press f0 to set the cannon flag to OFF or f1 to set it to ON. The last feature is a hidden message from the author – press M, C, R to see it.

Regular readers may remember details of a short routine for the disc version of Repton 3 that allows the player to view the map of any screen, not just screens A-E. It appeared in the June 1987 column and was sent in by M.C. Rogers of Colchester. Does that name sound familiar?

Mastering Vegas

James Harwood of St. Johns, Surrey points out that Mastertronic's fruit machine game **Vegas Jackpot** does not work on the Master, and offers a method of persuading it to run.

First, load the CONVERT utility on the Master Welcome tape or disc. Then enter:

```
*TAPE (if necessary)
LOAD"VEGAS"
*LOAD VEGAS1
PAGE=&1800
OLD
RUN
```

Thank you James.

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U·P·D·A·T·E

More power for word processor

TWO new Power Fonts with science and APL characters have been released by Ian Copestake Software (051-648 6287) for use with its Wordpower word processor.

Also new from Copestake are Power Fonts for 24-pin printers.

Copestake is offering a free trial Power Font with every copy of Wordpower, price £36. Cost of enabling printing of the font is £19 for 24-pin printers, or £32 for 9-pin users who also receive a full NLQ printing package. A new, lower price of £100 has been set for educational site licences.

Archimedes users can also use Wordpower with Power Fonts or opt for the new range of First Fonts designed to work with 1st Word Plus. First Fonts cost £19 each, or £14 if ordered with 1st Word Plus.

New courses

THE Microelectronics Education Support Unit (0203 416994) has begun holding one week courses as part of the Department of Education and Science "New Technology for Better Schools" strategy.

Funded by the education support grant for information technology, the familiarisation courses began in July when more than 550 newly-appointed LEA advisory teachers took part. A second round of courses will take place in September.

Safety drive

ON average four children die in household accidents every day in this country, and to help promote safety in the home North Cornwall District Council held a competition for local schools.

Local weatherman Craig Rich presented a £1,000 Archimedes system donated by Acorn Computers to the winners, Wadebridge Junior Girls and Infant School.

The winning entry was a dolls house with each room containing carefully designed, colour coordinated home safety posters.

Children also submitted a large poster, a book of quizzes, several board games, essays and poems – all with a home safety theme.

Lego under Logo

PRIMARY school pupils are taking their first steps with the new Lego Control Logo package which has been designed for class project work in control technology.

The package brings together the famous building and construction components from Lego (0978 290900) and the Logo language from Logotron.

It contains a complete set of support materials for primary teachers with no previous exposure to Logo, and provides practical classroom ideas, case studies and extension materials that can also be used by more experienced teachers.

The pack consists of Lego interface, six booklets and 5.25in disc, price £90. With Logotron Logo chip the price is £130.

Lego gets an electronic boost

More schools get Archimedes

LATEST education authority to equip its schools with Archimedes micros is Acorn's own home county. In a deal worth £300,000, 330 Archimedes 310 machines will be installed in schools throughout Cambridgeshire.

Under the Department and Trade and Industry purchasing scheme, 93 out of 126 UK education authorities have so far selected the Archimedes.

Safety-conscious children get their Archimedes

Perhaps not, on reflection

Product: The Hall of Mirrors
Price: £14.95
Supplier: BBC Soft, PO Box 234, London SE1 3TH.
Tel: 01-576 0548

TEACHERS have been waiting for someone to come up with a use for micros in drama for quite a while. So *The Hall of Mirrors* – designed to fill this gap – looked potentially very interesting. A further hook is the involvement of all-round educational drama genius Alan Lambert.

Based on the school's radio series *First Steps in Drama* it is aimed at the lower end of the primary age range and runs from disc in a standard adventure format. The story is about a journey through a magic mirror into the land of Vargas where the Master rules a downtrodden people with the help of a giant jackdaw. The players' task is to free the Vargans and return home.

All this is split into four parts. First you encounter Benny the dog, and some short term memory work based on nouns to be found at the seaside. However, Benny runs off and you must give chase. This leads you to the Haunted House where you are invited to climb, wade and wobble – though I don't expect children are supposed to do this at the time. The organisation of micro to dramatic movement activities does require some thought.

Once through the Haunted House you reach the Hall of Mirrors. More mathematical tasks await you here such as predicting the outcome of reflections and the changes of scale. Having completed the mirror work you move into part two – Vargas.

This starts, as do other sections, with a multiple choice Cloze test to check that you remember the story so far. Then comes a set of word games. The Bridge of Words requires you to make five words from the letters of *bridge* and you are also asked to find the missing letters in words as well as opposites and rhymes.

Part three asks you to trap the jackdaw by answering questions about your journey. Once trapped, the bird speaks in code which requires translation by hitting the key to the left of the one in the message – a nice micro implementation of various concentration games often used as part of drama lessons.

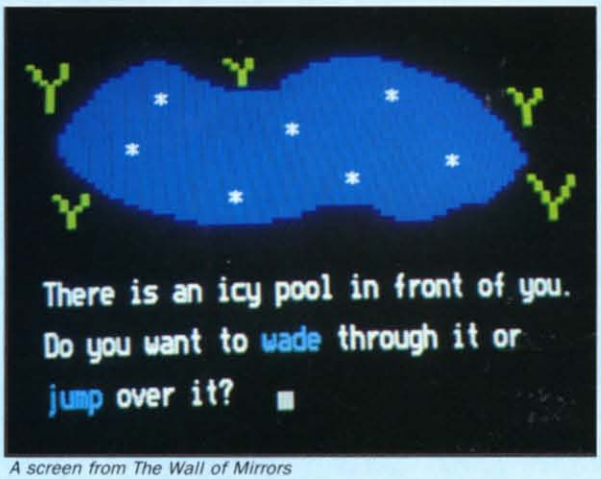
After much to-ing and fro-ing with the jackdaw you are taken to the desert to play an arcade game. Here you will find the silver needed to pay this feathered mercenary to take you to the Master's Sky Palace and the final section.

You are asked to find a password using the old *My first is in Fred and also in grip* format. Then there's a very nice piece of sequencing to operate the Master's cloud machine. To escape from the Sky Palace you must solve a fairly complex maze.

Having tried and failed to change the Master's ways with reasonable argument more drastic measures are now called for. So using a shape recognition game a mosaic is built to trap the jackdaw. Transfixed by it, the jackdaw crashes and brings down the Sky Palace, Master and all.

This package shows that there is definitely a place for the micro in the drama curriculum as a stimulus for drama and movement. Certainly many of the situations and puzzles set are rooted firmly in drama – moving through the Haunted House, working a cloud machine, constructing a mosaic and trying to convince the Master.

Unfortunately, along with these are many tasks that seem both trivial and contrived. This is often the problem with adventures but there are some particularly poor examples in Hall of Mirrors. For



A screen from The Wall of Mirrors

Points for

- Sound basic idea
- Excellent follow-up suggestions

Against

- Rather poor implementation
- Low production standards

The bottom line...

Only of use to those who follow the radio program.

example, what possible reason could the jackdaw have for moving closer every time you answer a question correctly? Other adventures have got over this kind of problem with narrative devices, but there is none of that here.

The narrative itself is very confusing, involving great gaps in the plot. These may well be filled by the radio program, but we were using it independently, as the documentation quite clearly suggests it is possible. Holes in a plot can be useful for creative writing as well as drama, but some clues are needed as to the reasons for things: There are few here.

The technical quality of the package is very disappointing. The use of Mode 7 graphics should be a thing of the past in disc-based software costing this much. Even the music from the Radiophonic Workshop is uninspiring. The main redeeming feature is the user guide. Here the authors get back to what the package is about: Drama, language and creativity.

The follow-up exercises suggested are simple, effective and easy to apply – always the hallmark of Alan Lambert's work. They encourage a means of development that will leave the shortcomings of the program behind.

If you have used the radio programme and based a substantial amount of work on it then Hall of Mirrors could prove useful. It also shows what might have been done. However if you are looking for an adventure to base cross-curricular work on, there are other more stimulating packages available.

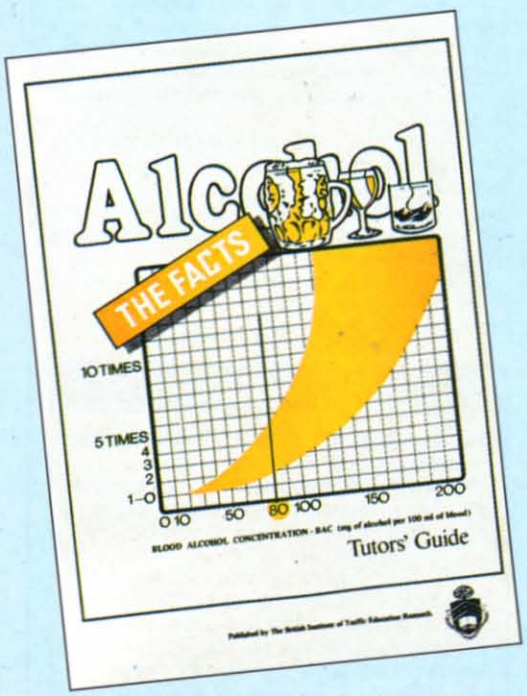
Marshall Anderson

Drink in the facts

Product: Alcohol – the Facts (disc)
Price: £10.45
Supplier: British Institute of Traffic Education Research, Kent House, Kent Street, Birmingham B5 6QF.
Tel: 021-622 2402

MOST schools operate some kind of social education for pupils aged 14 to 16 which is likely to contain work on the problems associated with alcohol abuse. With sensitive areas it is useful to have a variety of approaches, so this package is one which is sure to interest teachers with this responsibility.

Your money buys you a large A4-sized folder which contains a tutor's handbook, some workcards and fact sheets as well as software. The well-written and comprehensive guide gives full details on running the program and good advice on managing the lessons, together with a realistic set of aims and objectives.



The three fact sheets cover a number of alcohol-related topics: Production, various drinks and legal aspects. Worksheets cover a whole series of topics including such mysteries as the size of a measure of whisky in different parts of the United Kingdom. These materials, which can be used separately from the software, would in themselves make a valuable contribution to social education lessons.

Unfortunately the software is perhaps the weakest part of the whole package. On loading it you are presented with a menu with four options. The first tells you about the program – identical material is given on a separate pamphlet – while the last merely ends the program.

Option two gives you access to a database containing details of the strength of up to 100 drinks sub-divided by category. If a particular drink which interests you is not in the database you can add it.

Option three brings us to the meat of the program. Here, your personal details – weight, age, sex and usual drinking habits – are entered into the machine via an on-screen pointer. You then enter details of a specific drinking session and your blood and breath alcohol levels can then be calculated by reference to the database. Finally a zone graph is drawn which suggests how long it will be before your alcohol level is down to zero.

At no point is any attempt made to ram opinions or half-truths down the throat of a youngster; neither is a shock/horror approach used. Instead, this package concentrates on helping children to make their own reasoned decisions on their personal level of alcohol intake. There is certainly no question of an unbalanced or one-sided viewpoint and, in fact, the Brewers' Society gave factual help and cash to help to develop this package.

My main worry with this material is that it needs a sympathetic adult to lead the work. Whether it be a school or a youth club, there would be little point in just letting the youngsters get on with it.

Rog Frost

Points for

- **Comprehensive guide**
- **Realistic objectives**
- **Well-balanced facts**

Against

- **Needs good supervision**

The bottom line...

With good leadership, this low-priced package is very worthwhile.

B B+ hm Jafa

Micro Safe

Pam Turnbull takes a look at a rom that keeps your files and micro secure

Product: Computerlock Security Rom
Price: £25.00
Supplier: Computerlock, 7 Ganners Grove, Leeds LS13 2PW.
Tel: 0532 693393

MOST expensive electrical equipment has some sort of security device these days – whether it's the false video in your recorder or the multi-purpose security marker. You can mark your computer and make a note of the serial numbers, but this may not deter the theft in the first place or compensate you for the inconvenience and possible loss of information.

The security device from Computerlock does go some way to helping. Though the actual machine can be stolen, thieves may well be upset by the result of turning the computer on. Not only does the screen bear the legend of the authorised user to a musical accompaniment, but also your address and telephone number and you're prompted for a password.

'... thieves may well be upset by the result of turning the computer on ...'

You have three chances to enter the right code – get it wrong and a siren sounds, and the machine will not accept any other commands for a minute after which time you can try again. Get it wrong again and the siren sounds for two minutes, and so on if you continue.

All these details are programmed into a rom – not eprom – for you by Computerlock and you can choose any password you like. Instructions on how to install your rom are supplied and there's a sticker to display conspicuously on the micro.

The only problem I can foresee is the one common to all password protected systems – human fallibility: Tell someone that they cannot break into a system and they will try their upmost to do just that. Most people choose, as their passwords, derivations of their own name, and with personal details being displayed on screen this could make choosing the right word easier.

The only way to counteract this is to take care when choosing your code – don't be obvious in your use of permutations. There may be millions of them but it is surprising how many times the sames ones are used. If you are dubious, look at what your colleagues use as filenames.

But the Computerlock rom goes further than this: The manufacturers see the major implementation as being in the school environment. The password facility would be useful here, but much more important is another feature – the ability to scramble files of any length and recognise different types of files, identify them as DFS or ADFS and determine whether the file is locked. Scrambling long files can take some time: However, the additional command *LOCKD will encode and decode the whole disc.

Each lock rom is unique and the same machine must be used to unscramble your files – not following this instruction can lead to a loss of data. If you use more than one micro do not despair – it is also possible to scramble a file using a password. The same command will unscramble the file on any system with a Computerlock as this second password will bypass one built-in. For example I can use *LOCKF DATA PAM to do this.

But what about the people with screwdrivers in hand ready to deprive me of my rom? You could solder it in place, but it's easier to use a few drops of superglue. Dismantling a whole board to release this system is a little extreme for even the most ardent thief.

All in all I'd certainly recommend Computerlock if your micro is used by others and you need to protect your data.

The power-up screen after installing Computerlock

Applications

The most important use must be that vital files – such as reports and personal files – can be scrambled. While it provides a deterrent to prevent unauthorised use of your micro, a expert hacker did manage to use my micro while I was out of the office.

However, I gave him a scrambled file and he couldn't use the data. In places like school, security such as this would encourage more teachers to use their micros for their own records as well as in a classroom context.

Telesoftware Index

ABOUT 200 BBC Micro programs are now available free for downloading from MicroLink. They range from useful utilities to machine code games. New titles are added at regular intervals.

Details of how easy it is to obtain these programs appeared in the April issue of *The Micro User* letters page.

ADFS Menu
Air Strike (Part 1)
Air Strike (Part 2)
Album Indexer
Anagrams
Any Questions
Any Questions – File
Astromines
Atomic Protector (M/C Pt 1)
Atomic Protector (M/C Pt 2)
Atomic Protector (M/C Pt 3)
Attack of the Beastiriods
Aunotes – ATS Utility
Auto Run Utility
Automatic Art Gallery
Avengence
Ayo

Back Up DFS Discs to ADFS
Backgammon
Bad Program Repair
Balance
Balance
Barny Bee
Barrel Battle (Part 1)
Barrel battle (Part 2)
Basic – On Screen Editor
Basic Safety
Basic Transfer
Beetle
Bithday Mystery
Bouncy
Breakfree
Breakthru
Breakthru for Z88
Button rom

Catalog (Part 1)
Catalog (Part 2)
Catalog (Part 3)
Character Generator
Checksum Program
Chinese Chess (Part 1)
Chinese Chess (Part 2)
Choice
Code Catcher
Collision detection (Util)
Coloured Lights
Compressor
Compressor
Conversion Factors
Converter
Counting with Charlie
Cups

Daffy Duck
Dam Raider
Darts
Date Stamp
Death Watch (Part 1)
Death Watch (Part 2)
Denary Derrick (Part 1)
Denary Derrick (Part 2)
Diamond Quest
Dino
Directory Kill
Disassembler
Disc Copier
Disc Sector Editor
Disc Servicing
Diskloc – protection (Part 1)
Diskloc – protection (Part 2)
Dual Screen Editor – (Part 1)
Dual Screen Editor – (Part 2)
Dune Hunter

Envelope Generator
Espionage
Event Handler Utility
Extra Commands
Extra Function Key Commands

File Rescue
Fill Routine
Flying Fingers
French Tutor
Frogs
Fruities (Part 1)
Fruities (Part 2)
Function Keys

Galactic Invaders (Part 1)
Galactic Invaders (Part 2)
Games 6502
Gazeter
Geo-Fax
Goblins (Part 1)
Goblins (Part 2)
Gone Fishing
Graphic Gallery System
Grid Man

Half Life
Halma
Hide and Seek
Horoscope
Hunkie Egg

Invasion

Jumper

Keypress Utility
Keyword Capers
KingKong (Part 1)
KingKong (Part 2)
Knitting Patterns

LOGO-Tanks
Light the Candle (Part 1)
Light the Candle (Part 2)
List Hold
LoadCut
Loan Calculator
Ludo

MCL Compiler
Machine Code Games (Pt 5)
Macromate
Maltese Cross
Map Test
Mars Programs
Micro Golf
Micro Works
Mini Com
Mode 7 Screen Dump (Part 1)
Mode 7 Screen Dump (Part 2)
Mornington Crescent
Mouser

Nim
Nomsim (Part 1)
Nomsim (Part 2)
Noteplay
Noteplay (Part 1)
Noteplay (Part 2)
Number Invaders

Paint Calculator
Pear Picker
Pedometer (Part 1)
Pedometer (Part 2)
Pedometer (Part 3)
Peep
Pelmanism
Pendraw
Pinball
Pipeline
Pixel Editor
Pixel Source
Printer Buffer
Professor McBrolly
Prommer

Red Code Compiler
Rhondo
Road Racer
Robin & Marion (Part 1)
Robin & Marion (Part 2)
Rover

Santa & The Snowman
Santa's Saucer (Part 1)
Santa's Saucer (Part 2)
Santa's Sleigh
Save A life
SaveCut
Screen Dump for Basic
Screen Dump for Basic I
Scrolling (4 ways)
Shadows – Casting
Show
Sid
Sketch
Sky at Night
Snapper Upgrade
Soccer Manager
Space Arena (Part I)
Space Arena (Part 2)
Space Pilot (Part 1)
Space Pilot (Part 2)
Star of Command Performance
Stellar Rescue
Survive

Tape Backup Utility
Tape Inlay Printer
Teletext Carousel
Ten Pins
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The Beeb Body Building Course
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The Power Game(Board)
The Power Game(PMap)
The Power Game(Power)
Thunder Drums
Times Tables
Tower Bridge (Part 1)
Tower Bridge (Part 2)
Tracking Sprites (Util)
Tweetie

VDU 19 Light Show (Extra Part)
VDU 19 Light Show (Part 1)
VDU 19 Light Show (Part 2)
VDU 19 Light Show (Part 3)
VDU 19 Light Show (Part 4)
View Preview
View Ruler

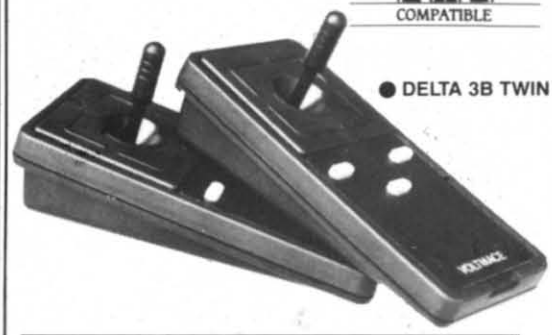
Weather Vane
Wheat Farm (Part 1)
Wheat Farm (Part 2)
Witch Hunt
With Overlays
Wordwise Safety

X15
Xmas Box

Z88 Archiver Program

3D Drawer
3D Surfaces

VOLTMACE



COMPATIBLE

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Full instructions are provided to include the keypad in your own programs even in BASIC or for the non-programmer a DELTA DRIVER cassette is available with keyboard to joystick/keypad conversions and keypad set up programs.

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Compact COMPATIBLE

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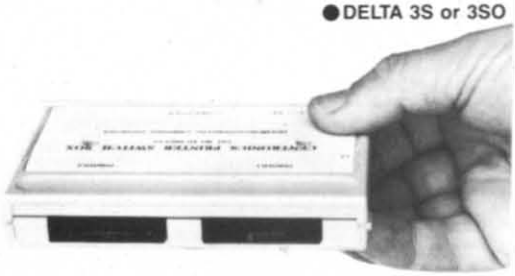

●DATAPRINT 2P

NEW !!! DATAPRINT 2P LOW COST – LOW PROFILE – PRINTER SHARER £34.95
A neat small unit which allows two parallel printers to be connected to one computer and simply switched between the two. e.g. one printer for paper and one for labels.

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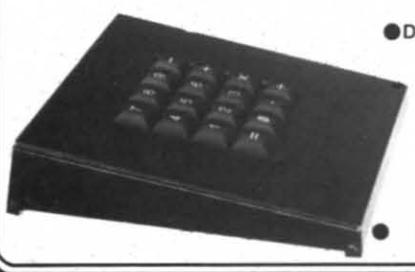
The opposite of the DATAPRINT 2P this little box just 125 x 90 x 20mm allows two computers to share one printer.

Computer to Sharer leads	£5.00
Sharer to Printer leads	£5.00



● DATAPAD 16B

DATAPAD 16B £39.95
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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

Seeing red

I AM using an amber screen Taxan KX12 long persistence monitor. When programs that are in colour are run the reds are not visible no matter how I adjust the contrast and brightness. Can you assist by suggesting a hardware solution to this problem? – **Adrian Bawden, Warminster, Wilts.**

● *You need to alter the amount of red contributed to the composite video signal from your micro. This is controlled by resistor R117 – the standard value is 1K. If you increase its value to, say, 1K5 red will be bright. Do not go over 2K or it will be indistinguishable from the green signal.*

Double filing

MY BBC B has an Opus DDOS 3.45 fitted and I was wondering if it would be possible to upgrade to an Acorn ADFS but still keep the DDOS for compatibility.

As they both run on the WD1770 chip, I imagine that there should be no problem, but would like confirmation of this before parting with my money. – **Jon Arch, Tervuren, Belgium.**

● *You can have the ADFS and DFS in your micro as the correct disc controller is fitted. I have not tried this with the Opus system but I see no reason why it should not work – I normally load the ADFS system into sideways ram when I need it.*

Wobbly micro

MY BBC Micro has run without problems up until a month ago but now, after between 30 minutes and one hour on, it emits a painful beep and random rubbish comes up on the screen. Normally mixed in with this are Basic commands such as STR$, NEXT and sometimes, when I'm programming in Basic, it will beep and the errors *Bad Hex* or *Bad address* will come up.

All keys remain usable, but quite often I have to press Break to continue. Can you give any hints as to what is going on? – **A. Collins, Folkestone, Kent.**

● *This is what is known as a* soft crash *– the system continues to work after it has thrown a wobbler. What you need to do is to find out if the fault is associated with any mechanical movement of the micro like pressing the keys. If so, your problem is probably a loose connection in the micro so try pushing all chips down and reseating all the connectors.*

If the crash occurs totally by itself a chip may be going faulty intermittently. Without examining the micro it is impossible to say which this could be.

Compact colours

COULD you please tell me how to convert the video output on the Master Compact to a colour UHF output to be used on a TV? Also, I have a power supply unit that converts 240V AC to 12V DC. If wired correctly could I use it to power a single disc drive? – **M. Fearon, Grappenhall, Cheshire.**

● *The video output from a Compact is monochrome and the only way to get a colour UHF one would be to connect the RGB output to a PAL encoder and then modulate the output. Unfortunately, an encoder would cost you more than your micro.*

A disc drive needs 5 volts and 12 volts DC to drive it – these need to be regulated to within 0.25 of a volt. I suspect your power supply would be an unregulated one and therefore would not be stable enough.

Kaput colours

I BOUGHT a BBC Master in June 1987 and to my disgust when I switched it on there was no colour. I had the UHF unit replaced – which I believe should have cured the problem – but it didn't help.

I have since had the micro looked at again only to be told that with some BBC Masters you can't get colour through a TV set. Is this true and if so can I buy anything to cure the problem? – **R.D. White, Basildon, Essex.**

● *The cure would seem to be to get yourself a better dealer – the description of the micro clearly states that it should provide a modulated UHF composite colour output. As it does not then under the Sale of Goods Act you have the right to*

Turn to Page 46 ►

On the agenda...

- **Monitor colour problems**
- **Using two disc systems**
- **The micro soft crash**
- **Connecting micros to video recorders**
- **Corruption on Stryker's Run**
- **Sticking keys on a BBC Micro**
- **Using unusual printers**
- **Faulty colour output to TV**
- **Using Compacts with a television**
- **Scart connections to a colour TV**

◀ From Page 45

have your money back or a micro that fits that description. As you saw, there is no point in replacing the UHF modulator as there is a fault in the chromanance generator circuitry.

In video

I RECENTLY got an old Sony Betamax C5 video recorder and wondered if you could tell me how I can use it with my BBC Micro? Also, on the back of my micro I noticed a video out socket. What is it for and can I use it with my recorder? – **Trevor Fisher, Harrogate, N.Yorks.**

● *I am not sure what you want to do with your micro and video recorder. The video out connector gives a 1 volt composite video signal – the sort required by monochrome monitors. However, you can use this socket from your micro to record the screen display. You need to connect this up to the video input of the tape recorder and you could, for example, generate titles for your tapes.*

First Stryke

I OWN a BBC B which seems to have a fault: In Stryker's Run a multi-coloured strip appears at the bottom right hand corner of the screen. As Stryker moves to the right it gradually takes over the lower graphics, making the game unplayable. There is no fault with the tape – I have had it tested on two other machines – and my micro seems OK because I have many games, but Stryker's Run is the only one which shows this disruption. Have you any idea what may be going wrong? – **J. Mecalfe, Winsford, Cheshire.**

● *It looks as if the software is going wrong, but as it works on other machines this sounds unlikely. Also as other games work on your micro then obviously that appears to be working.*

It sounds as though a stack is growing across the screen and the only reason I can think for this is that a memory pointer is being incorrectly incremented. These pointers are in page zero, so it could be that you have just one byte faulty in the first part of the memory and if other games do not use this they would not show up any fault.

Key issue

I HAVE a BBC B and a small, but very annoying problem – my Z key often gets stuck. This means that whatever I type, I usually get a couple of Zs before it. My friend has recommended something called Electro-lube. Will it work? – **E. Bowen, Cheltenham, Glos.**

● *Your friend is correct – Electro-lube will probably cure it. It's a lubricant especially designed*

for electrical work and all you need to do is carefully prise off the key tops and apply a single drop down the shaft of the switch. Then work it up and down a few times before replacing the top, but be very careful not to break the top off as the whole switch would need to be replaced and they are very difficult to get hold of.

Make the connection

AT the moment my Master is connected via the BNC monochrome output to pins 17 and 20 on the Scart input of my television. This works fine but obviously produces a black and white picture. I have already tried connecting the Master via the RGB socket directly to the red, green and blue pins – 15,11 and 7 – on the Scart using pin 20 as the Sync and joining all the earth pins – 5, 9 13 and 17 – together. But this did not work.

Also, if I upgrade to an Archimedes, would the above connections work then, since that uses an analogue RGB output? If not, is there any way of making them work? – **Jummy Imossi, Gibraltar.**

● *You do not say what type of TV you are using but what you are trying is basically correct – there is no standard as regards TV connections, so I can't be sure.*

A TV might have a Scart socket on the back but that does not mean to say that all the Scart connections will be implemented. It is often the case that separate RGB inputs are not implemented on TV sets, and sometimes they need a composite sync signal on the green input.

The RGB inputs, when implemented, are analogue but this does not stop you using them on the digital outputs from your micro. The Archimedes, however, needs a monitor with analogue inputs.

It is possible to get a composite colour signal from your Master by making link LK11: It is not fitted, but appears as a small rectangular box with two holes – simply solder a link across. Some earlier versions of the Master do not have this on the printed circuit board, and in this case you will have to solder a 470pF capacitor between the base of the transistor Q13 and the emitter of transistor Q12.

Alien printers

IS it possible to connect a Commodore 8023P printer to a BBC Master 128? If so, what do I need to do regarding connecting up and would it accept the output? – **L.J. Fowl, West Croydon, Surrey.**

● *The Commodore printers use a very non-standard type of interface – a mixture between serial and IEEE – so there is no economical way of using this printer with the BBC Micro. Uneconomical ways of interfacing are possible by building an interface and patching the software, but this would cost you more than a new printer.*

Have you any hardware problems with your BBC Micro? If so, write to Mike Cook, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP, giving full details of your system and the problem.

Unfortunately, Mike cannot send you personal replies, but as many questions as possible will be answered on the pages of The Micro User.

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Note: If you use your BBC Micro's auxilliary power socket for your disc drive, or any other external device, you will need a power supply which we can provide for an additional £9.95.

IMPORTANT: The BBC points out that a teletext adapter, like a TV set, will not work satisfactorily without a good outside aerial. Nor will it function correctly if you experience reception problems such as ghosting. They emphasise that these problems only affect a few areas of the country. However if you have any doubts as to the quality of signal available in your area you should contact the BBC Technical Support Service during office hours on 01-927 5040.

TO ORDER PLEASE USE THE FORM ON PAGE 119

B B+

Enter one well filled album

Mike Cook offers his solution to our sticky problem

It's a challenge!

OVER the last couple of months we have been outlining a problem for you to solve involving the collection of cards or stickers in an album.

Last month I described the algorithm and many of you have already written in with solutions. Although my mathematical friends and I thought the problem couldn't be solved by straight number crunching there's even been a couple of mathematical solutions – one is shown on the Letters pages.

So, on to my solution. You might like to have another look at last month's article as you go through the listing. If you've solved the problem in a completely different way – or even taken into account more variations of the sticky puzzle than we've mentioned – we'd like to see it. So, send it to Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.

We'll give £10 for the best solution that exactly simulates the filling of a sticker album.

WHEN I write a program I like to get it working first and then make it look pretty. So to that end the last thing I do is modify print statements to give a reasonable display. But let's look at how the program works...

Lines 50 to 80 define all the constants used. By doing this rather than putting numbers in the program I can, for example, change how many cards I can buy from the publishers by simply changing line 80. Lines 90 to 110 then clear the variables needed to accumulate the average.

Lines 130 to 510 define the infinite REPEAT...UNTIL loop for the program with lines 210 to 380 containing the loop to fill one album. Before it is entered we must clear out the album and reset the number of packets bought and duplicates collected. This is done in lines 160 to 200. Now we add one to the number of packets and generate a new packet of cards. The picture on the card is the value in the array element.

To stick them in the album we need to take each card – the loop counter in the FOR...NEXT loop – and use its value as the array index of the album. As the *ALBUM* array is either *TRUE* or *FALSE* there is no need to put anything else in the IF statement before the THEN. So, in plain English, line 290 reads: IF the *ALBUM* position corresponding to the card we are looking at is true THEN we have a duplicate or ELSE put the card in the album.

Lines 310 to 350 count the number of cards we have then the current situation is printed out. Line 380 decides if we have collected enough cards to buy the last few from the publisher or if we need to buy another pack of cards.

When our album is full lines 390 to 420 print out the result. The remaining lines keep a running total of all the runs so far and print out the average results. Note here the INT function in the average calculation stops messy and meaningless strings of numbers after the decimal point.

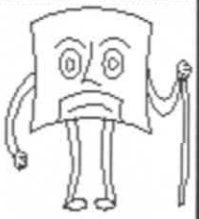
When I ran this 77 times for a 220 card album the average cost worked out at £13.92 – 116 packs. This does not include the cost of buying the last few cards. In fact the number of cards you are allowed to buy to complete your collection has a great effect on the number of packs you need to buy.

Try setting this to zero and see how the average shoots up. If you want to improve on this program how about plotting a graph of the number of cards in the album against the number of packs you have bought? So, are you ready for our next Programmer's Challenge?

```
   10 MODE7:Z%=RND(-TIME)
   20 PRINT"CHALLENGE No. 2"
   30 PRINT"THE CARD ALBUM CAPER"
   40 PRINT"By Mike Cook"
   50 PC%=12 : REM PACK PRICE IN PENCE
   60 NP%=5 : REM NUMBER OF CARDS PER PA
CK
   70 NR%=220 : REM NUMBER REQUIRED
   80 NS%=15 : REM NUMBER YOU CAN BE SHO
RT
   90 TA%=0 : REM TOTAL NUMBER OF ALBUMS
  100 TP%=0 : REM TOTAL NUMBER OF PACKS
BOUGHT
  110 TD%=0 : REM TOTAL NUMBER OF DUPLIC
ATES
  120 DIM ALBUM(NR%),PACK(NP%)
  130 PRINT:PRINT"For a ";NR%;" card alb
um"
  140 PRINT"Costing ";PC%"p per ";NP%;"
card packet"
  150 REPEAT
  160 FOR A%=1 TO NR%
  170 ALBUM(A%)=FALSE
  180 NEXT
  190 PP%=0 : REM PURCHASED PACKETS
  200 DUP%=0 : REM NUMBER OF DUPLICATES
  210 REPEAT
  220 REM FILL A PACKET
  230 PP%=PP%+1
  240 FOR A%=1 TO NP%
  250 PACK(A%)=RND(NR%)
  260 NEXT
  270 REM NOW STICK THEM IN THE ALBUM
  280 FOR A%=1 TO NP%
  290 IF ALBUM(PACK(A%)) THEN DUP%=DUP%+
1 ELSE ALBUM(PACK(A%))=TRUE
  300 NEXT
  310 REM SEE HOW MANY WE HAVE
  320 CC%=0 : REM CARD COUNT
  330 FOR A%=1 TO NR%
  340 IF ALBUM(A%) THEN CC%=CC%+1
  350 NEXT
  360 PRINTTAB(0,8);CC%;" Cards from ";P
P%;" packs";SPC(3)
  370 PRINT"You need another ";NR%-NS%-C
C%;SPC(3)
  380 UNTIL CC%>=(NR%-NS%)
  390 PRINT
  400 PRINT"Last time you required"
  410 PRINT;PP%;" packs until ";NS%;" ca
rds from full";SPC(4)
  420 PRINT"you had ";DUP%;" duplicates"
;SPC(2)
  430 TD%=TD%+DUP% : REM DUPLICATES
  440 TP%=TP%+PP% : REM TOTAL NUMBER OF
PACKS
  450 TA%=TA%+1 : REM TOTAL NUMBER OF AL
BUMS
  460 PRINT:PRINT"After ";TA%;" Tries on
 average"
  470 AP=(INT(TP%/TA%)*PC%)/100
  480 PRINT"You needed ";INT(TP%/TA%);"
Packs"
  490 PRINT"Costing £";AP;" per album"
  500 PRINT"You collected ";INT(TD%/TA%)
;" Duplicates";SPC(3)
  510 UNTIL FALSE
```

Vine Micros Ltd - World Exclusive !

This is the story of Gerald the Game



Gerald the Game sat in his cassette box. He was fed up. No-one played him any more. He would just lie there in his owner's desk, unused and unloved. He was jealous of the disk games in the drawer above who were always being played. He'd wondered why it was that his owner bought him in the first place, if he was only to be used a few times. But Gerald, being quite intelligent, was beginning to realise why. It was because he was stuck on cassette. Tapes were slow and cumbersome and he took too long to load into the computer, so he was hardly ever used!

That night something amazing happened... He was free from the cassette and its box and was running and spinning around so fast that he could not believe it! He was being played far more than ever before... Gerald awoke in a frenzy. It was only a dream, he said to himself. "No it wasn't", said a nearby voice. "Your dreams will come *true*, Gerald". Gerald immediately realised who it was - his Fairy Game-Mother. "When? When will they come true?".... "Tomorrow", she replied, and disappeared.

The drawer opened... Gerald was picked up and put into the tape player, and slowly he began the long process of loading. Would this be the last time?.... Eventually he was in and running. But suddenly something stopped him in mid play - he was frozen! Then he felt himself spinning, faster and faster .... He was now on a floppy disk! Loading him in now took just a few seconds. He had a new lease of life... But how had this happened? The answer was simple... his owner had bought a **REPLAY**....

Access/Visa accepted on 0304 812276. Please state machine and DFS when ordering.

Please send me more details of REPLAY
Name: .....
Address: .....
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.....Postcode: .....
Send to: Vine Micros Ltd, Marshborough, Sandwich, Kent. CT13 0PG. GG2

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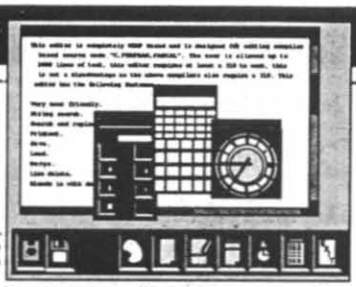

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CLOCK, A clock with a difference ! . Big ben digitised and incorporated in the archimedes desktop.
DIARY, Same design and function as Acorns standard diary.
NOTEPAD, An improved version of Acorns notepad, with direct pointer driven input.
PALETTE, A Palette of the same design as the Acorn Palette.
BBC CONVERTOR, This program blends into the desktop, when a RS232 lead has been connected between the BBC and the Archimedes select the 5.25' disk icon and a window showing the files on the BBC B disk drive appears on the archimedes. To load files just select them with a mouse (as many as you want) , and from the desktop menu select load to make the files transfer automatically from the BBC to the archimedes. The baud rate is set at 19200 baud although any speed can be used, the Convertor is intelligent and recognises automatically the file types contained on the BBC's disk drive.
EDITOR, This is an optional facility for editing source text files for compilers (FORTRAN, C, PASCAL etc), to work it must be used on at least a 310 (this is not a disadvantage as none of the compilers are able to work on a 305). This advanced program blends fully into the desktop environment, and is very user friendly and intuitive in its use, the maximum text size is 2000 lines. The files produced are compatible with twin, it is entirely WIMP driven and needs no control/function keys.
The basic editor functions included are string search, search and replace, load, save, merge, print, clear.

"This kit from Brainsoft can be thoroughly recommended" from review in Archive magazine December 1987.

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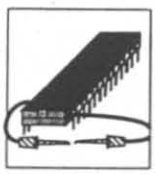

*Uses latest technology.
*32K of ram in a size no larger than a EPROM.
*No soldering required the ten leads clip on.
*Takes up only one sideways rom socket.
*Does not use user port but uses APE30 register.
*Low power consumption.

Incompatible with rom boards except Peartree MK3000.

BRAINSOFTS 16K COMPATIBLE WITH MOST ROM BOARDS.

This module has been tested with the following boards:- ATPI, Watford, and Peartree MK3000.
This module has the same construction of the 32K module but is minus the bank select line.

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At little extra cost a write protect switch can be added to a module which allows "protected" software to be loaded.
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-PROGRAMMERS UTILITIES are a collection of 25 utilities including a full-screen-memory editor, all variables clear, program relocation, program compaction, program repairer, rom list, rom enable, rom disable, rom status, speed control, computer status, string search, variable list, vector list, close all files, list of the currently active variables, keyload, keysave, program comparison with a file held on disk, rom save, and screen compaction/uncompaction which can pack a mode 0 screen in less than 1K of disk space.
-ADVANCED ROM FILING SYSTEM provides the user with fast access to programs and data, so fast that it can load a 20K program quicker than the BBC's CLS command takes to clear the memory. The ARFS is capable of storing files longer than 32K in length, the amount of file space is limited to the number of sideways ram the user has, the number of files, length of names being limited by only the rom size. The ARFS when enabled by *ARFS acts like a disk interface allowing saves and deletions, as well as loading, many programs which use 'legal' disk calls are compatible.
Also provided on the disk are three BASIC programs which can be easily adapted to run on NETROM systems, ramload, ramsave and ramlist.
Provided with the sideways ram utilities is a 12 page instruction book, the software is supplied on a 40T disk with 80T conversion software.

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The portable link

Steve Gold takes a look at the Z88 pocket modem

Product: Z88 pocket modem including Comm-88 software
Price: £172.45
Supplier: Cambridge Computer, Bridge House, Bridge Street, Cambridge CB2 1UE.
Tel: 0223 312216.

A LOT of BBC Micro users have chosen the Z88 as a portable companion to their BBC B – probably because BBC Basic is the laptop's programming language. Cambridge Computer has recently released the Z88 pocket modem package so the micro now enters the world of communications.

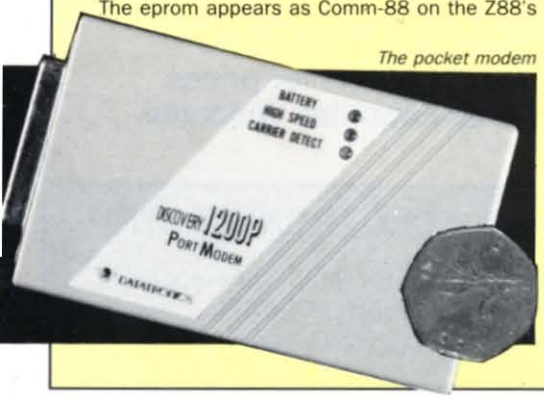
While the Z88 is a highly portable machine, its use to date as a communications terminal – not to mention its ability to talk to deskbound machines such as the Model B and Master – has been limited by the relatively limited built-in terminal and file import/export facilities.

The Z88 pocket modem package – although not BT approved – allows you to get online to services like MicroLink by using automatic log on sequences, and it also provides a number of other very useful features.

The package comes in the now-familiar Z88 wrapping of a cameo figure looking at a ream of computer printout with the Z88 logo superimposed on his/her hands. Inside is a compact box containing a Datronics Discovery 1200P pocket modem and a 32k eprom cartridge.

The modem is, in fact, the same pocket model that Digital Matrix began shipping late last year for around the £200 mark. This means that the Cambridge Computer deal effectively gives you the comms software free, as well as a £50 discount on the price of the modem.

The eprom appears as Comm-88 on the Z88's lefthand index. In common with other eprom-based cartridges for the Z88, the software is protected to the extent that it is not possible to peek at the names of the files on the eprom.



The pocket modem

Comm-88 is actually a slightly facility-reduced version of Wordmonger's Z-Term software. Most of the features of the full-blown program are available, but the package is tailored specifically to the Datronics modem.

Unless you're very nifty when it comes to hardware and software switching on modems – and this makes a Hayes-compatible modem a must – you'll find it difficult to persuade Comm-88 to function effectively with anything other than the Datronics pocket modem.

The modem in use

The Discovery 1200P modem is a beige unit no bigger than a deck of cards. Power comes from an integral replacable 9 volt PP3 battery.

On one end is the familiar 25-way RS232 serial interface and into this you plug a supplied 25-way to 9-way – Z88-style – serial cable. On the side of the unit are two female telephone sockets, one for the line and the other for a standard phone.

Although the modem is controlled more or less user-transparently by the Comm-88 software, it is a Hayes-compatible unit capable of 300/300 and 1200/1200 baud modem tones working to UK and US frequencies.

Tucked away inside the battery compartment is a four-gang set of DIP switches which control respectively: Bell/CCITT frequencies, Auto-answer state (on/off), DTR (Data terminal ready) state (real or forced true), and carrier detect (real or forced true).

If you're using the Discovery modem solely with the Z88 and Comm-88 software, then the DIP switches – as well as much of the modem manual – can be safely ignored.

If, however, you're curious and/or adventurous with modems, then the 56-page A5-sized manual provides a thorough grounding in the Hayes command set and how it can control a modem such as this.

Three small LED lamps are located on the front of the modem showing, respectively, the state of the battery, the speed of the call – 1200 baud equates to high speed – and carrier detect.

The modem's integral loudspeaker can be set

Turn to Page 52 ▶

Points for

- **Good value for money**
- **Supports 1200/1200 full duplex**
- **Comes with Z88 software**
- **Small and functions well**

Against

- **Software not for experts**
- **Not BT approved**
- **Doesn't support split baud rates**
- **Battery powered – it could prove expensive**

◀ From Page 51

to remain on continuously, while the call is connecting or quiet at all times. Additionally, the speaker's volume can be varied under Hayes-command control.

In use, the modem behaved impeccably, performing as well as larger modems costing twice as much. The provision of the 1200/1200 baud full duplex facility proved a boon when it came to uploading electronic mail to MicroLink and other online services.

The eprom-based Z88 software proved to be a beginner's dream but – unfortunately – a problem for an experienced comms enthusiast like me. This is because it is almost autocratic in its insistence on controlling all stages of logging on and off an online system. You can't initiate a modem call without submitting yourself to at least some of the automatic features of Comm-88.

Having said this, the novice comms user is well-cocooned in an envelope of controlled logons to scrolling Ascii and/or viewdata online services, such as MicroLink and Prestel.

The scrolling Ascii facilities are excellent and include the ability to configure to both 7 and 8 bit systems. Other features include the provision of both Ascii and X-Modem file transfer facilities.

When running under the scrolling Ascii mode of Comm-88, the terminal emulation is glass teletype. This lacks some of the advanced features of the VT terminal emulation seen on the Z88's integral software, but is sufficient for most needs.

The viewdata emulation is good for a laptop micro and spools each frame into an area of screen ram – which you can peek at through an eight-line window on the full viewdata screen.

As with the scrolling Ascii terminal mode, the viewdata emulation allows you to save chunks of data – in this case complete frames – to ram, ram cartridge or additional eprom.

Conclusions

I used the pocket modem extensively with several micros including a BBC B and a Z88 via the supplied Comm-88 software. I've even used it with my cellphone for complete portability and it worked well from a stationary train. A free sign-up package for MicroLink is also supplied – a useful addition to a value-for-money package.

I found the modem itself an excellent addition to my hardware collection but, in an ideal world, I would have preferred the full features of the Z-Term software – the complete Z88 comms terminal sold separately by Wordmongers.

Having said this, the Z88 packet modem package offers suprisingly good value for money and, if you're after a good comms package for your Z88 as well as a modem you can use on your BBC Micro, this is the best option on sale today.

The bottom line...

A good modem that performs well on the Z88 or BBC Micro

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Hard copy is easy

Simon Stafford discusses three ways to print from Basic

THERE are a number of things the Z88 manual does not reveal too clearly – including how to print from within a Basic program. So let's look at three methods of doing just that. The secret of the first method lies in the fact that the Z88 treats the printer as one of its devices – Figure I lists them all.

:RAM.0	Internal (unexpanded) ram
:RAM.1	External ram in slot 1
:RAM.2	External ram in slot 2
:RAM.3	External ram in slot 3
:RAM.–	Non-specific ram for temporary files
:SCR.0	The screen
:PRT.0	The printer
:NUL.0	Null device
:COM.0	Communications port

Figure I: The Z88 devices

As you can see, the printer device specification is :PRT.0 or :PRT by default. To produce printed output, you have to select the printer device and send data to it in the same way as you would send output to any ordinary file.

The easiest way is to add to the end of your program a short procedure which emulates the LPRINT statement found in other dialects of Basic.

Listing I shows such a routine prepared as a text file in Pipedream. You can replace AUTO 30000,10 with other values if you require a different start line or increment. At the head of the program, #B selects Basic and .J *jams* the special control characters in the text file – see page 199 of the Z88 User Guide for more details.

Ascii codes 5 and 91 turn the printer driver on – 5 and 93 turn it off. The PRINT# statement sends your string to the printer with a Return at the end of the string. Code 10 adds a line feed if your printer needs it. You can send other codes in the same way to obtain special effects available on your printer, such as underlining, italics and so on.

The loop at the ninth line introduces a pause so

```
#B
.J
AUTO 30000,10
DEFPROC_lprint(P$)
X=OPENOUT":PRT.0"
BPUT#X,5
BPUT#X,91
PRINT#X,P$
BPUT#X,10
BPUT#X,5
BPUT#X,93
FOR P=1 TO 1000:NEXT
CLOSE#X
ENDPROC
```

Listing I

that the Z88 does not close the file before it has had a chance to transfer the string to the printer. You can change it to suit your own printer but this loop should suffice.

When you have entered the routine, save it as LPRINT.asc using the plain text option so that it can be added to your main program as if it has been typed at the keyboard. You can then add the procedure to your program in one of two ways. Either, select the filer and type:

```
◊ EX LPRINT.asc
```

or, from the Basic > prompt you can use the

Turn to Page 55 ►

"The Z88 treats the printer as one of its devices"

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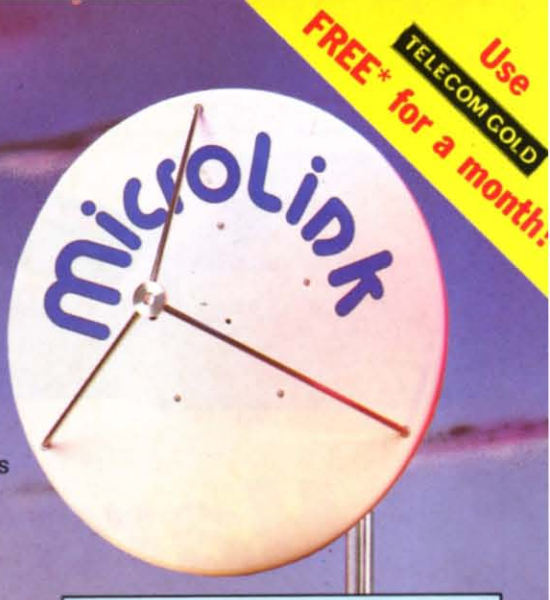

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◀ *From Page 53*

command line interpreter directly by entering:

```
*CLI .*LPRINT.asc
```

In both cases the procedure will be appended to your Basic program, and because you have included the AUTO command at the head of the text file line numbers will be added automatically. Incidentally, you can use the same handy technique to merge other segments into your programs. Also, by including NEW before AUTO, you can use the method to enter complete programs.

Once the CLI has finished typing in the lines for you, press Escape and you are ready to continue with your Basic program. Now text can be printed by a call to PROC_lprint, passing the required string to it. If you want to pass numbers or numeric variables you'll have to convert them to strings using the STR$ function first. To round off method one, Listing II shows the procedure in action.

The second method is equivalent to Control+B on a BBC Micro. If you want text printed on the screen to be sent to the printer as well, select the printer by entering □+P before running the program. At the end, use □–P to turn off the printer output. This technique results in absolutely everything printed on the screen going to the printer. If that is not what you want it's best to use PROC_lprint.

```
100 PROC_lprint("This will appear on the printer")
110 A$="and so will this"
120 PROC_lprint(A$)
130 PROC_lprint(STR$(88))
140 Y=47
150 PROC_lprint(STR$(Y))
160 END
```

Listing II

The final method is for those occasions when you don't have access to a printer and want to store output from a program for printing later. Just use □+S and □–S in place of □+P and □–P of the previous method and your output will be spooled to a file with the system-generated filename S.sgn.

When you want to print it out you can either load it into Pipedream as plain text and print in the usual way, or transfer the file to your BBC Micro and print it from there.

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Diary full of data

Andrew Moore shows how to generate interesting diary dates

WITH the arrival of the Z88 a long-awaited event has happened – diary meets portable micro. This should make a formidable combination: Diaries are a simple method of storing and organising information, and adding sophistication to information processing is what computers are all about. The Z88's diary comes with many useful tools for diary information management – storage, retrieval and printing facilities all sitting behind a very friendly word processor interface. However, the exciting possibilities have only been touched.

The electronic diary can have entries generated, updated and analysed automatically. In this article I will explain how to do this on the Z88 and the listing on page 59 will be well worth typing in as an example of the techniques described.

As well as efficiently recording all the public holidays up to the early nineties and automating the entry of birthdays, it also generates some unusual and often forgotten significant dates. Did you know that if you were born early in 1957 you will be one billion seconds old any day now? BBC Micro owners who wish to generate such startling, important information about themselves and their friends can also enter the listing with the changes shown and a file – DIARY – suitable for loading into a word processor will be generated.

Accessing the Diary on the Z88 from a Basic program would be tricky and obscure if it was not for the Z88 CLI: This is exactly the sort of purpose it was designed for. A CLI command is a list of characters and execution of the command causes precisely the same effect as if those characters were entered at the keyboard.

By prefixing a character with a hash character – # – you can simulate pressing the square key, and diamond key commands need a bar – | – character before them. This allows the CLI command to enter applications other than Basic and thus to affect them. The tilde character – the just below the Break key – is used in front of others to represent keys that cannot be directly entered into the string. These are listed in the *Advanced use of the filer* appendix of the Z88 manual but for our purposes three are sufficient:

~D Down arrow.
~R Right-arrow.
~E Enter.

The following one line program is a simple example: Calling PROCSOUNDON will switch the sound and keyclick facility on.

```
2000 DEF PROCSOUNDON : OSCLI "*CLI #S~DY~RY~E": ENDPROC
```

This, therefore, simulates someone pressing □S, entering the Z88 panel, moving the cursor down one row, saying *Y* to the keyclick option, moving right, answering *Y* again to the sound option and finally hitting Enter to leave the panel. The reason this is useful is that PROCSOUNDON can be called automatically from a Basic program which wishes to turn on Sound and Keyclick, rather than either having to ask the user to do it or using an obscure and dangerous POKE.

Now for an example of a more entertaining use of the CLI. PROCDIARY is a short routine to construct a CLI command to enter a string at a given date in the Z88 diary. This you will find at lines 550-600 in the listing. At first glance it would be

Turn to Page 59 ▶

THE PROGRAM ON A BBC MICRO

On the BBC Micro you can still generate lists of the interesting dates even if you have no diary in which to insert them. The listing can be modified easily to create a file on disc or tape that you can load into your word processor.

First you need to open a file. Enter an extra line to do this:

```
45 X%=OPENOUT"DIARY"
```

Line 590 should be changed to write to this file rather than enter and update the diary:

```
590 FORY%=1TOLEN(B$):BPUT#X%,ASC(MID$(
B$,Y%)):NEXT:BPUT#X%,32:FORY%=1TOLEN(A$)
:BPUT#X%,ASC(MID$(A$,Y%)):NEXT:BPUT#X%,1
3
```

The last essential alteration is that you need to close the file. Change any END commands to CLOSE#X%:END and STOP to CLOSE#0:STOP. You'll find these in lines 90,140,390 and 630.

There are a few of other changes you can also make if you wish, but they don't affect the running of the program. Lines 70 and 440 to 470 can be omitted as it is not worth listing birthdays if they aren't being entered into a diary. Lines 570 and 610 to 640 can be left out because you don't need to check the string – it isn't being passed to the CLI.

Finally, to be exact, the four minutes in line 490 can be changed to half a minute. This doesn't mean the BBC Micro is eight times faster – it isn't entering the data into a diary.

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◀ *From Page 57*

a fair comment to say it looked rather obscure, but the panel right explains it in more detail.

So, CLI commands are not tremendously complicated and you can easily concoct similar structures to your own taste.

The string mustn't contain any of the special characters – dot, hash, bar or tilde. This is important as, if it does, execution control might be suddenly sent to a random application with unpredictable results. The procedure PROCCHECKSAFE(A$) aborts if *A$* has such a character and should be used whenever an unknown string is to be inserted into a similar CLI command.

The rest of the program has three useful components for filling up an empty diary. First you are invited to give the day and month of birth of as many of your friends and relatives as you desire. Their birthdays are recorded up until 1991. Secondly the program interprets a compact representation of all the public holidays – only for England and Wales, I'm afraid – until 1992 and enters them into the diary.

The final component requires the complete date of birth of any individual or institution you wish to generate special anniversaries for. It inspects their age in all of the important units of time, and works out the next occurrence of a significant value. The date of each such value is entered in the diary so that when your micro warns you that the day has come round you can throw a party or impress your boss by congratulating her or him on reaching half a million hours or whatever. The algorithm actually assumes you were born at midnight and is not accurate to the precise moment of birth.

You should be able to add many further facilities to this program for other automatic diary entries. One idea would be Biorhythm analysis. You can use FNN(<todays date>) minus FNN(<date of birth>) to calculate your age in days, which you can then use to record oncoming biorhythmically-bad days.

HOW PROCDIARY WORKS

The procedure is called with four parameters: D,M, *and* Y *are numbers representing the day month and year,* A$ *is the message to be inserted in the diary. So calling:*

```
PROCDIARY(21,12,1988,"Shortest Day")
```

will cause the following CLI command to be generated:

```
*CLI #C~E|D21/12/1988~E#D|NShortest Day#B
```

Now let's look at this somewhat bizarre structure, remembering the meanings of #, ~, and |pi.

CLI command	Acts as	Action
#C	□C	Enter the Calendar
~E	Enter	Hit Enter to allow keying-in a new date
|D	◊D	Delete the default date
21/12/1988		The desired date
~E	Enter	Accept this date
#D	□	Move to that date in the diary
|N	◊N	Clear a line for the new entry
Shortest Day		Acts as if *Shortest Day* was typed
#B	□B	Return to Basic

```
  10 REM Diary Data Deriver
  20 REM by Andrew Moore
  30 REM (c) The Micro User
  40 DIM M(4),N$(4) : FOR I = 0 TO 4 :
READ M(I) : READ N$(I) : NEXT I
  50 DATA 0.14285714,weeks,1,days,24,ho
urs,1440,minutes,86400,seconds
  60 CLS : PRINT "DIARY DATA DERIVER by
 Andrew Moore" : PRINT "----- ---- -----
--"
  70 PRINT "Add Birthdays? "; : IF FNYE
S THEN PROCBIRTH
  80 PRINT "Shall I enter Public Holida
ys (up to 1991)? "; : IF FNYES PROCHOLS
  90 PRINT "Now for fun. Shall I discov
er interesting days? "; : IF NOT FNYES T
HEN END
  100 REPEAT : PRINT "Enter date of birt
h of something (e.g. yourself)"
  110 INPUT "<day>,<month>,<year> (inclu
de centuary)";D,M,Y
  120 INPUT "Enter name of thing";D$ : P
RINT "You would prefer Short Term signif
icance?"
  130 IF FNYES THEN K = 0.35 ELSE K = -0
.2
  140 PROCSPECIAL(FNN(D,M,Y),FNN(1,8,198
8),D$,K) : PRINT "Repeat ? "; : UNTIL NO
T FNYES : END
  150 DEF FNN(D,M,Y)
  160 NY = Y*365 + INT(Y/4) - INT(Y/100)
 + INT(Y/400) + 1
  170 NM = 31*(M-1) - (ASC(MID$("0033445
55667",M)) - ASC"0")
  180 IF M < 3 AND Y MOD 4 = 0 AND ( Y M
OD 400 = 0 OR Y MOD 100 <> 0 ) THEN NM =
 NM - 1
  190 = NY + NM + D
  200 DEF PROCDMY(N)
  210 H = 1+INT(N/365) : L = INT(N/366)
: Y = -1 : REM if -ve Y finding year els
e month
  220 REPEAT : M = INT((H+L)/2) : IF Y <
 0 THEN N1 = FNN(1,1,M) ELSE N1 = FNN(1,
M,Y)
  230 IF N1 > N THEN H = M ELSE L = M
  240 IF H-L<2 THEN IF Y < 0 THEN Y=L :
L=1 : H=13
  250 UNTIL H-L<2 : M = L
  260 D = N + 1 - FNN(1,M,Y) : ENDPROC
  270 DEF FNYES : PRINT CHR$(7)+" Y/N ";
 : A$ = GET$ : PRINT : = (A$ = "Y" OR A$
 = "y")
  280 DEF PROCDATECHECK(D1,M1,Y1)
  290 PROCDMY(FNN(D1,M1,Y1))
  300 IF (D1 = D) AND (M1 = M) AND (Y1 =
 Y) THEN ENDPROC
  310 PRINT  STR$(D1)","STR$(M1)","STR$(
Y1)" is not a valid date" : STOP
  320 DEF PROCSPECIAL(NB,NT,A$,KSIG)
  330 FOR Q = 0 TO 4 : S = 10~INT(LOG((N
T-NB)*M(Q))-KSIG)
  340 I = S * INT(1 + (NT-NB)*M(Q)/S) :
PROCDMY(NB+INT(I/M(Q)))
  350 PROCDIARY(D,M,Y,A$+": "+STR$(I)+"
"+N$(Q)+" old today")
  360 NEXT Q : ENDPROC
  370 DEF PROCPUBLIC(Y,D$)
  380 PROCDIARY(25,12,Y,"Merry Christmas
!")
  390 M$ = "Easter Sunday" : REPEAT
  400 PROCDIARY(FNDECODE(MID$(D$,1)),FND
ECODE(MID$(D$,2)),Y,M$)
  410 M$ = "Public Holiday"
  420 D$ = MID$(D$,3) : UNTIL D$ = "" :
ENDPROC
  430 DEF FNDECODE(A$) : IF ASC(A$) < 64
 THEN = ASC(A$)-48 ELSE = ASC(A$)-55
  440 DEFPROCBIRTH
  450 REPEAT : INPUT "Enter : <day>,<mon
th>,<Name of birthday-holder>";D,M,D$
  460 FOR Y = 1988 TO 1991 : PROCDIARY(D
,M,Y,D$+": Happy Birthday") : NEXT Y
  470 PRINT "Any more birthdays? "; : UN
TIL NOT FNYES : ENDPROC
  480 DEF PROCHOLS
  490 PRINT "This will take about four m
inutes"
  500 FOR Y = 1988 TO 1991 : READ D$ : P
ROCPUBLIC(Y,D$) : NEXT Y : ENDPROC
  510 DATA 34U5T8QCRC,Q32103R313T3S8QC
  520 REM thats an "oh" _"
  530 DATA F411D4G475S5R8QC,V311T31465R5
Q8QC
  540 ENDPROC
  550 DEF PROCDIARY(D,M,Y,A$)
  560 PROCDATECHECK(D,M,Y)
  570 PROCCHECKSAFE(A$)
  580 B$ = STR$(D)+"/"+STR$(M)+"/"+RIGHT
$("000"+STR$(Y),4) : PRINT "Diary: ";B$,
A$
  590 OSCLI "*CLI #C~E|D"+B$+"~E#D|N"+A$
+"#B"
  600 D = INKEY(0) : ENDPROC
  610 DEF PROCCHECKSAFE(A$)
  620 FOR I = 1 TO 4 : A = ASC(MID$("#|~
.",I)) : FOR J = 1 TO LEN(A$)
  630 IF A = ASC(MID$(A$,I)) THEN PRINT
"String bad for CLI: "+A$ : STOP
  640 NEXT J : NEXT I : ENDPROC
```

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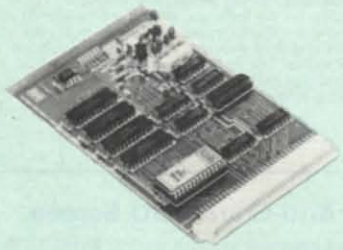
Archimedes Real-Time Digitiser



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SPECIFICATION

SOFTWARE

All the driver software for the digitiser is contained in a ROM on the podule. Facilities provided include:

- Grabbing of images to the screen or dumping to memory.
- Continuous grabbing and display for previewing or camera alignment.
- 'Hot key' grabbing – pressing a (configurable) key combination grabs and displays an image on the screen while another program (e.g. paint software such as Artisan) is running.
- Scaling (zoom/shrink) any section of an image to any size in X and Y directions, with optional X/Y flip, window clip and logical (AND/OR/XOR) plotting.
- Rotation and scaling to any angle and size, rotating about any point, with optional window clip, and logical (AND/OR/XOR) plotting.
- Very versatile matrix printer screendump facility for Epson FX, LQ and EX compatible printers – pictures can be printed to ANY size (including multiple sheets) at any orientation, using any available printer density and one of six internal sets of dot patterns, or with user definable patterns (pattern editor supplied). The screen-dump can also be used for general purpose graphics screen printing.
- Pixel value lookup tables: pixel values can be passed through a user defined lookup table to allow contrast enhancement, thresholding pseudo-colouring etc.
- Smoothing and noise spot removal to enhance image quality.
- Creation of sprites from all or part of a digitised image.
- Saving and loading of digitised images in compressed format.
- Combination of pictures by adding, avaraging, subtracting, multiplication etc.
- Much faster versions of the Arthur *ScreenLoad and *ScreenSave commands.

Software facilities are accessed via operating system star (*) commands and SWI calls. High resolution screen modes using MultiSync type monitors are supported.

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A disk is included, containing sample pictures, examples and utility programs including the following:

- Colour image grabbing using colour filters with monochrome or colour cameras, including colour balance adjustment and scaling facilities.
- Pattern editor for 2 colour display modes and printer screendumps.
- 512 line interlaced display for non MultiSync monitors.
- Thresholding to create two colour images.
- Capture and replay of animated sequences.
- Several example programs illustrating the use of digitiser software.

RESOLUTION

Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied).

SPEED

Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

HARDWARE

The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Automatic video level control and black level clamping circuitry is used, to ensure that the optimum contrast is obtained from a variety of video sources. A filter is included to avoid patterning effects when using colour sources.

Price £249

Watford Electronics are Appointed & Authorised DEALERS / REPAIR CENTRE for Acorn Computers Ltd Microvitec Monitors Panasonic Printers

NEW

BBC PCB DESIGNER

At last! A PCB design package for the BBC Micro that eclipses some industry CAD software. Hard to believe, isn't it? Just look at some of the impressive package specification:

- Library Component Designer
- Component Library (over 200 parts)
- Component List Editor
- NetList Editor
- PCB Board Designer
- Plotter Driver
- Dot Matrix Printer Driver

This integrated suite of programs is packed full of sophisticated PCB related features making the design of a circuit board a dream instead of a nightmare.

Input for the design may be manual or Auto mode.

Some of the PCB Designer's features are:

- Over 120 library pad sizes/shapes
- Four colour adjustable palette
- Zoom range 2:1 to 1:4
- Highlighting of specific tracks
- Normal and surface mounted components
- Rapid screen review
- Menu driven
- Variable gridlock
- Switchable measurement grid
- Pre-select pan/scroll facility
- Large 24" x 24" Board size
- Copy route facility
- Connectivity held at all times
- Ratsnesting of part connections
- Auto-plaement of text references
- Text linked to parts
- Automatic placement of vias
- Printer and plotter outputs provided
- Comprehensive manual

TYPES OF PLOT OUTPUT

Top and bottom track artworks, top and bottom silkscreens, solder resist mask, drilling detail drawing and check plot. All these may be with pad holes on/off, scale of 2:1 or 1:1, board edge on/off, 90 degres rotation, mirror image, width of pen, x & y offsets and batch plots to disc.

The above is only a taste of the superb features of this software, surely capturing previously unknown performance from the BBC Master computer. BBC B owners will need to fit at least one block of sideways RAM, Shadow screen memory and a disc drive. A trackerball or a mouse is also required.

Introductory Offer: £99

(Please write in for further technical details)

Continued →

MONITORS & SWIVEL BASES

All Monitors are supplied complete with BBC connecting leads FREE.

MICROVITEC 14"

- 1431 – Standard resolution as used on the BBC television computer programme **£175**
- 1451 – Medium resolution, suitable for word processing in mode 0 **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro **£359**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
- **2030 CS 20" Med Res** **£380**
- **2040 CS 20" Hi Res** **£675**
- Dust Cover for Microvitecs **£5.50**
- Touchtec 501 Touch Screen **£239**

TAXAN 12" & 14"

- **TAXAN Super Vision 2 Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing **£263**
- **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£313**
- **TAXAN 14" Multisync 770 Plus** – An autoscanning Ultra high res, colour monitor. Ideal for Archimedes, IBM & Compatibles **£495**

- **NEC JC-1401P3EE 14"** Multisync Ultra Hi-res Intelligent Colour monitor. Auto scans frequencies between 15KHz to 35KHz. Text switch provides 7 colours for Database & wordprocessor. **£489**

PHILLIPS Monochrome 12"
BM7502 Hi-res Green **£69**

STAR BUY

- **PHILLIPS 14"** Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £195

Dust Cover for above Phillips Monitor **£6**

NEW

SPECIAL OFFER
AMBER MONITOR

dT MERLIN 12" Hi resolution Amber monitor. Ideal for wordprocessing. Consealed front panel mounted controls. Illuminated mains meon rocker switch. Supplied complete with BBC Cable.

Only £49
(Offer valid while stocks last)

N.B. carriage on Monitors **£7** (securicor)

SPARE LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for TAXAN Monitors	**£3**
Archimedes Colour Monitor Lead	**£7.50**

for Video Monitors
By placing your monitor on one of our professional swivel bases (see monitors drawing on the left), you gain the freedom to adjust the monitor viewing angle to suit your needs and thus alleviate eye strain and reduce back stress. The front mounted adjustable control dial makes adjusting the monitor viewing angle very simple.

for 12" Monitors **£7** (carr. £2.50)
for 14" Monitors **£10** (carr. £2.50)

Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. Hundreds of these screens are in daily use in various branches of one of the leading High Street banks.

£12

TAXAN KP-815 PRINTER

80 column, Bi-directional, 160 CPS, (NLQ 24cps); Friction & tractor feed + paper roll holder as standard; Epson FX compatible.

Offer Price £159

Taxan KP915 132 Column Printerr (carr £7)	**£275**
RS232 Interface	**£49**
RS232 Interface with 2K Buffer	**£69**
RS232 Interface with 16K Buffer	**£89**

Panasonic KX-P1081

Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLQ mode. Character width range from 5 cpi to 17 cpi. Upto 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.
(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£145** (carr. £6)
Optional RS232 Interface: **£39**

Panasonic KX-P3131 Daisy-Wheel Printer

Low-cost, high performance; Bi-directional, Logic seeking, Proportional spacing, 10, 12 & 15 CPI, Speed 17CPS. 6K Buffer.

Only **£255** (carr. £7)

Single Sheet Feeder	**£175**
Tractor Feed	**£90**
Daisy Wheel (various)	**£12**
Ribbons: Standard **£4.50**; Long Life **£7**	
Extra 32K Printer Buffer (internally fitted)	**£10**

Panasonic KX-P4450 LASER PRINTER

Now available from stock. Please write in for technical details

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

Price: £275

Cut Sheet Feeder	**£65**
Additional Font Cartridge	**£25**
NEC P2200 Pinwriter Ribbon	**£6**

NEW

NEC PINWRITER P6/P7 Plus

The Ultimate matrix Printer for Business.

It took time to make it from the drawing board to the business office, but the Pinwriter P6 Plus the 80 column width and P7 Plus wide carriage printers are finally here. They are equipped with just about all the capabilities you could ever need.
Some of the features are:

- Print Speed, 265cps in Draft and 90cps in letter quality.
- Inbuilt Tractor & Friction feed.
- A paper park & low tear of facility.
- 20 inbuilt FONTS as standard.
- A Font cartridge facility.
- 80K byte Printer Buffer as standard.

Added to all this is a 24 Pin printhead for high quality output, their Centronics parallel interface for easy connection to your computer. Both Pinwriters are software compatible with previous NEC 24 pin Printers, Epson LQ800/1000 & IBM XL24. Colour option is available (optional extra). All this at our launch offer prices of:

P6 Plus 80 columns	**£415**
P7 Plus 136 columns	**£490**
Cut Sheet Feeder	**£125**
Colour Option	**£74**
Serial Interface	**£73**

(For further details, write in for our technical leaflet).

EPSON PRINTERS

EX800	**£415**	LQ850	**£469**
EX1000	**£569**	LQ1050	**£599**
FX800	**£315**	LQ2500+	**£825**
FX1000	**£425**	LQ2550	**£899**
GQ3500 Laser	**£1290**	LX800	**£199**
LQ500	**£285**	SQ2500	**£975**
Star LC10	**£175**	LC10 Colour	**£219**

PLOTTERS

Hitachi 672 Colour Plotter	**£475**
Plotmate Plotter A4S	**£379**
Plotmate Plotter A3M	**£549**

CUT SHEET FEEDERS for
EX800 **£130**; EX1000/LQ25550 **£195**; FX800 **£135**; FX1000 **£169**; LQ/LX800 **£125**; LQ850 **£135**; LQ1050 **£175**.

TRACTOR FEED for
EX800/1000 **£78**; LQ800 **£44**; LQ850 **£69**; LQ1050 **£75**; LQ2500 **£195**

ACCESSORIES

- EX800/1000 Colour Option **£55**
- EX800/1000 Colour Ribbon **£18**
- LQ2500 Colour Option **£65**
- Epson Paper Roll Holder **£19**

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	**£27**	RS232 + 2K Buffer	**£52**
IEEE 488	**£65**	RS232 + 8K Buffer	**£62**

Universal Printer Sharers/Changers

Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables.
(Ideal for School environments.)

Connects	Serial	Centronics
2 to 1	£24	£25
3 to 1	£34	£35
5 to 1	£44	£45

(Cables extra at £6 each. Please specify type required when ordering)

INTEGREX COLOUR JET PRINTER

● Colour Jet 132 Printer	£515
● Paper Roll	£6
● Screen Dump Software	£10
● Colour Cartridge	£14
● Black Cartridge	£8
● 100 A4 OHP transparencies	£55

Professional Printer Stand

This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £2.50)
132 Column version £26 (carr. £2.50)

PRINTER LEADS

Centronics lead for the BBC

Standard length (4 feet long)	*£6*
Extra long (6 feet long)	*£8*
Compact's Special Centronics Lead	*£7*
Archimedes Printer Cable	*£7*
RS232 Cable	*P.O.A.*
IBM/Archimedes Parallel 1 metre lead	*£7*
Double ended 36 way Centronics Lead	*£9*

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	*Ribbons*	*Dust Covers*
BBC Micro	–	*£3.50*
BBC Master	–	*£4.00*
Archimedes Micro pair	–	*£9.00*
Brother HR15/20	*£3.00*	*£5.00*
DMP2000	*£4.00*	*£4.75*
EX/LQ800	*£7.50*	*£4.50*
EX/LQ1000	*£8.00*	*£5.00*
RX/FX80/85/800/MX80	*£4.00*	*£4.95*
RX/FX100/1000	*£6.00*	–
Kaga/Texan KP810/815	*£5.25*	*£4.00*
LQ2500	*£9.00*	*£5.50*
LX80/86/800	*£4.00*	*£4.50*
M1009/GLP	*£4.00*	*£3.75*
Panasonic KX1080/81	*£4.50*	*£4.75*
SQ2500	*£25.00*	*£5.50*
Star NL10	*£4.00*	*£4.50*

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

● *1,000 Sheets 9½" × 11" Fanfold Paper*	*£7*
● *2,000 Sheets 9½" × 11" Fanfold Paper*	*£12*
● *1000 Sheets 9½" x 11" NCR 2 Part Fanfold*	*£19*
● *1,000 Sheets 15" × 11" Fanfold Paper*	*£9*
● *1000 Sheets true A4 Fanfold Paper*	*£11*
● *2000 Sheets true A4 Fanfold Paper*	*£19*
● *Teleprinter Roll (Econo paper)*	*£4*

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	*£5.00*
1,000 90 × 36mm (Twin Row)	*£4.90*
1,000 90 × 49mm (Twin Row)	*£7.50*
1,000 102 × 36mm (Twin Row)	*£6.25*

Carriage on 1,000 Labels £1.00

MEGABUFFER 256

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

***Only £179** (carr £2)*

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

New Launch Offers
Disc Drives DP35-800S

A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£119**

BBC Screen Dump	£10
Colour Ribbon	£6
Black Ribbon	£6

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

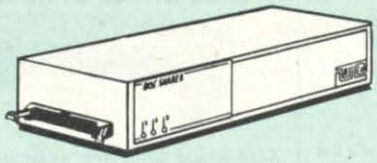
£5.95 (No VAT)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Continued →

NEW

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for five years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£58**
- *Acorn's 0.90 DFS Kit complete* **£59**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** • *ADFS ROM only* **£25**

NEW

Watford's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our MkII DDFS board has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00.**

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

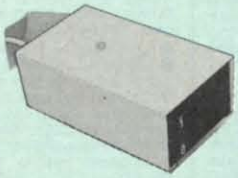
SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400S

- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)

3½" DISC DRIVE OFFER



These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- **CLS35 400K Unit** **£69**
- **CLD35 800K Unit** **£126**

Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

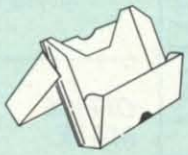
£6

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** - holds upto 50 5¼" discs **£6.00**
- **M85** – holds upto 95 5¼" discs **£8.00**
- **M25*** – holds upto 25 3½" Discs **£5.50**
- **M50** – holds 50 3½" Discs **£7.50**
- **M10** – holds upto 10 Data Cartridges **£15**

* Not lockable



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

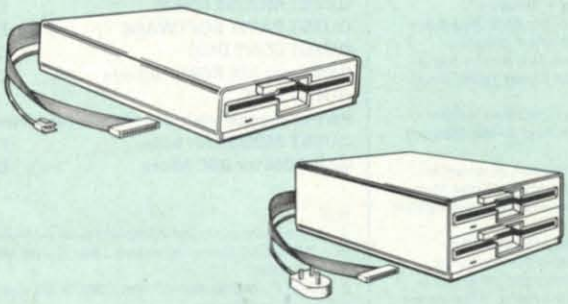
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £98	
400K (720K)	CLS400S £82	CLD 400 £168	CS 400S £92	CD400 £188
800K (1.44M)		CLD 800S £162		CD 800S £182

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

*Prefix **C** = Cased Drive*
L = Less PSU
S = Single
D = Double

*Suffix **S** = 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives
simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5¼" S/S D/D 40 Track Diskettes (744)* **£6.00**
- *10 × 5¼" D/S D/D 40 Track Diskettes (745)* **£7.50**
- *10 × 5¼" S/S D/D 80 Track Diskettes (746)* **£11.50**
- *10 × 5¼" D/S D/D 80 Track Diskettes (747)* **£11.75**
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* **£19**
- *10 × 3½" S/S D/D 40/80 track Discs* **£10.00**
- *10 × 3½" D/S D/D 40/80 track Discs* **£11.75**
- *10 × 3½" High Density Diskettes* **£37**

TOP QUALITY 3½" & 5¼" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 × **M3** 3½" D/S D/D 80 Track Discs* **£13**
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* **£5.00**
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* **£7**
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* **£9**
- *3" Double Sided Discs* **£3** *each*

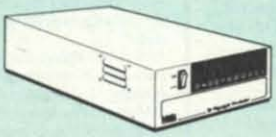
PRICES SLASHED

Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48



WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a full user guide and full utilities including file copy, 1000K save routines, Format and Verify – in fact all you need and more.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBc B (with 17 X disc interface).

● 10 Megabyte **£350** 30 Megabyte **£425**

CDP800S **CDPM800S**

Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £192
CDPM 800S for Master £196
DP35-800 for BBC/Master £165
(For DP35-800S spec. see Page 4 of our advert)

(Securicor Carr. £7)
(The above drive units are 2 Megabytes unformatted)

Continued

NOMINATED FOR

MICRO COMPUTING BRITISH AWARDS 1987

QUEST MOUSE

QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87

"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."

"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87

"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87

". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..."

". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."

"Quest Paint is a major leap forward in BBC programming. . ."

"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87

"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."

". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".

"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".

"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".

"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".

"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".

"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."

"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".

"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:

"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".

Lt. Cln. C.G. Holton, G2 HQ 1 (BR) Corps, BFPO 39, writes:

"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim".

Beeblet User Group, New Zealand Oct '87:

"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".

"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".

"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

QUEST MOUSE & QUEST PAINT	**£54**
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	**£82**
QUEST MOUSE ONLY	**£25**
QUEST PAINT SOFTWARE	**£32**
QUEST FONT DISC	**£12**
ConQuest 32K ROM Package	**£29**
QUEST MAT	**£3**
Part-exchange your old Mouse for a New QUEST MOUSE for only	**£23**
GXR ROM for BBC Micro	**£22**

N.B.

1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.

2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

MARK II LIGHT PEN

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21

(Price includes FREE software Disc and Operating Manual)

RB2 Marconi Tracker Ball

RB2 (AMX/Quest compatible)	£52
RB2 including Quest Paint	£78

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Software Pack for Compact	£40
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

THE NEW Mk III AMX MOUSE

ONLY: £59 Inc. Super Art package (carr £1.50)
(Please specify for BBC, Master or Compact)

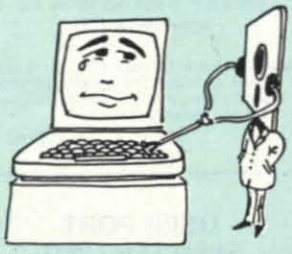
FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX UTILITY Package	£11
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	£32

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£12
AMX DESIGN (ROM)	£55
AMX 3D ZICON Disc	£19
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£15

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)
A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

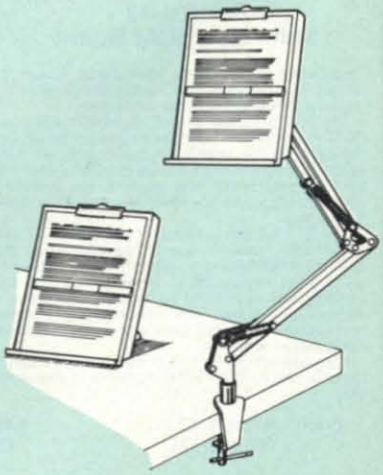
Complete Package **£135.00** (carr. £3)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS

Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £3.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£24** (carr £3.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

Continued

ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

● Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:	Aries B-12	**£40**
	Aries B-12C	**£5**

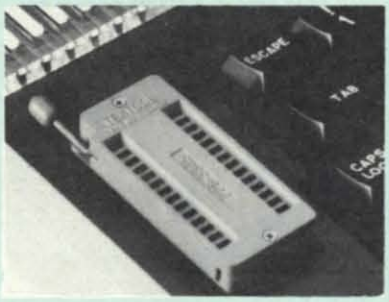
ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

All prices in this advert are exclusive of VAT.

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY **£16** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

ROM Cartridges for the BBC Master
Twin **£7.50**; Quad **£11**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

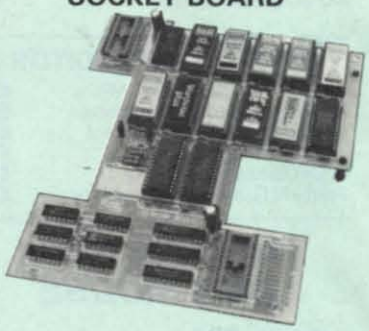
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

● The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
Battery Backup only **£3**
(carriage £2)

● Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

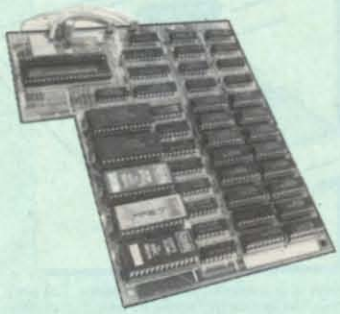
Only: £8

USER PORT SPLITTER UNIT

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM ***£45***
- ROM/RAM card with 64k dynamic RAM ***£59***
- ROM/RAM card with a massive 128k dynamic RAM **£89**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£16**
- 16k Dynamic RAM for Upgrade **£16**
- Battery backup **£3**
- Read and Write protect switches ..... **£2** each

Complete ROM-RAM board
All options installed **£115**

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£82***
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£15 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£82** **(Carr £3)**

Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£12
Delta 3B Twin Joysticks	£17
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.

Only **£10** (£2 carr.)

Versatile BEEB SPEECH SYNTHESISER Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£46
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£25

Wordwise £23

Wordwise plus £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £42

Inter SHEET ONLY £37

INTER CHART ONLY: £25

Inter-WORD £36

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM **£76**

INTERBASE £49

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£35
VIEW 3.0 ROM	**£48**
VIEW PROFESSIONAL	**£65**
HI-VIEW (for use with 6502 2nd Processor)	£36
VIEWSHEET (Acornsoft)	£36
VIEWSTORE	£36
VIEWSPELL with 80 track disc	£29
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£20
VIEW-INDEX	£12
OVERVIEW Packs 1 & 2 for the Master	£72

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
ROM Version	£43.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

EPSON NLQ ROM

for the BBC Micro

Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

VIEW PRINTER DRIVER ROM

View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

ROM-SPELL

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

The Micro User Feb. 1985.
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

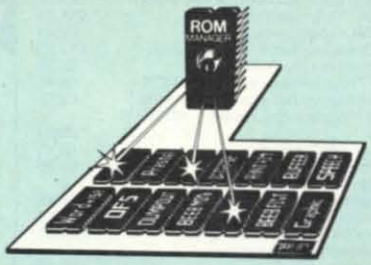
For use with the following printers:
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

Only: £25

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£11.25**
- Maths with a Story 2 (Disc) 4 further maths programs **£11.25**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£17**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£20.00**
- BONDING: Science (Disc) O Level Chemistry program. **£20.00**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£20.00**
- ELECTRONICS IN ACTION (Disc) O Level program **£19.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£11.25**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£21.70**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£19.95**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20**
- Astronomy – Primary (Disc) **£12**
- Computers at Work – Primary **£17.35**
- Introducing Geography – Primary **£17**
- **Introducing Geography 11-17yrs** **£17.50**
- Electric Fields 6-14 years **£11.25**
- BlackQueen Contract Bridge **£13**
- Espana Viva – 3 Discs **£19.95**
- A Vous La France Disc **£21.50**

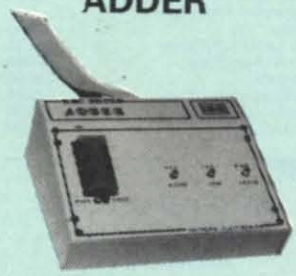
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£75 (£3 Carr)

TEX EPROM ERASERS

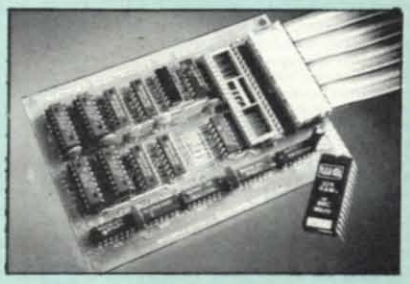
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.
- Recommended by Computer Concepts for use with their Inter series of ROMs.

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued →

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£5.95
15 Hr Wordprocessing BBC/WW & WW+	£5.95
30 Hour BASIC (BBC Micro)	£9.95
6502 Assembly Language Program	£19.95
6502 Application	£13.95
6502 Development Package	£7.50
6502 Programming the	£16.95
6502 Reference Guide	£10.95
68000 Assembly Language	£15.95
68000 Assembly Language Prog.	£19.95
68000 Assembly Language Techniques	£24.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£18.95
8086/8088 Assembly Language Prog.	£11.95
8086/8088 Programming the	£17.95
Advanced Disc User Guide	£16.95
Advanced Prog. Guide to BBC	£9.95
Adv. Sideways RAM User Guide	£9.95
Advanced User Guide for BBC	£10.95
Amiga Hardware Ref Manual	£23.70
ARM Assem, Lang, Programming	£12.95
Art of Microcomputer Graphics	£15.95
Assembly Language Prog. for the BBC	£9.95
Basic ROM User Guide	£11.95
BBC – Advanced Graphics with the	£10.95
BBC – Advanced Programming Techniques for	£8.95
BBC Micro & the small Business	£5.75
BBC Micro Basic Sound & Graphics	£7.95
BBC Micro Programs in BASIC	£5.95
BBC Micro ROM Book	£10.95
BBC Master 128 for High Flyer	£10.95
BCPL User Guide	£14
BCPL The Language & its Compiler	£7.95
C Big Red Book of	£7.50
C - A Dabhand Guide to	£14.95
'C' Introducing	£9.95
C for Programmers	£9.95
C Programming Lang.	£23.95
COMAL – Introduction to	£9.50
Complete FORTH	£6.95
Computer Graphics & CAD fundamentals	£9.95
CP-M Bible	£16.50
CP-M Handbook with MPM	£9.95
CP-M Plus Handbook	£13.95
CP-M Soul of	£16.50
CP-M The software BUS	£8.95
DOS Instant Reference (up to 3.3)	£10.95
DOS, Mastering for Versions up to 3.3	£19.95
Disc Drive Projects for Micros	£6.50
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
dBase II – Working with	£9.95
dBase III Plus	£12.95
dBASE III Plus, Quick Ref. Guide	£4.95
dBase III Tips & Tricks	£14.25
File Handling on BBC Micro	£7.95
FORTH – Advanced	£9.95
FORTH – A Text Reference	£19.10
FORTH – Introduction to	£8.95
FORTH on the BBC Micro	£9.95
FORTH – Starting	£19.10
Hackers Handbook - New	£6.95
Hitch-Hikers Guide to A.I.	£8.95
Interfacing and Robotics	£15.95
Introduction to COMAL	£9.50
Introduction to FORTH	£8.95
Introduction to LOGO	£6.95
Introduction to PASCAL	£17.95
Inside Information, Computers & Coms.	£9.95
ISO-PASCAL Reference Manual	£9.95
LISP 2nd Edition	£15.95
LISP Looking At	£11.95
LISP on the BBC Micro	£7.95
LISP the Language of Artificial Intelligence	£13.95
Logo on the BBC Micro	£7.50
LOGO – Introduction to	£6.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering Assembly Code	£8.95
Mastering CP-M	£17.95
Mastering Interpreters & Compilers	£14.95
Mastering Music	£6.95
Mastering the Disc Drive	£7.95
Master Operating System	£12.95
Master Reference Manual Part 1	£14.00
Master Reference Manual Part 2	£14.00
Master Reference Manual – Advanced	£19
Mathematical Prog. in BBC Basic	£7.95
Micro Prolog	£10.00
Microtext for the BBC	£10.00
MS-DOS Illustrated	£18.45
MS-DOS Instant Reference Guide	£10.95
MS-DOS Performance Programming Under	£19.95
MS-DOS Supercharging	£17.95
MS-DOS Advanced Programming	£19.95
MS-DOS Running (3rd Ed.)	£21.95
MS DOS Commands Quick Ref. Guide	£3.95
PASCAL – Introduction to	£17.95
PASCAL Programming	£9.45
Pick Operating Sys. Practical Guide	£14.95
Practical Disc File Techniques	£5.95
Quick Program Ref. Guide – MS-DOS	£8.95
Quick Program Ref. Guide – Wordstar	£8.95
Quick Program Ref. Guide – dBASE III PLUS	£8.95
Sinclair Z88 Computing	£9.95
Structured Basic	£7.95
The Epson FX-KAGA PRINTER Commands REVEALED	**£5.95**
The Software Business	£5.50
Towers Int. Transistor Selectors	£14.95
Understanding Interword – A Beginners Guide	£6.50
Using DOS+ on the 1512 (95% Ok for 512 Bd)	£9.95
View 3.0 User Guide	£10
View Guide (View 2.1)	£4.50
Viewsheet & Viewstore Dabhand Guide	£12.95
Mastering View, Viewsheet & Viewstore	£12.95
VIEW Dabhand Guide	£12.95
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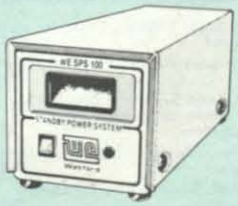

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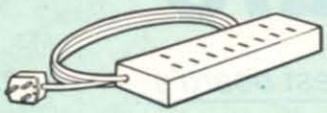

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THE BEEB BODY BUILDING COURSE

Building for the future

Mike Cook looks at his test board's circuit in more detail

LAST month we looked at the outline design of the experimenter's interface board. Now let's get down to the nuts and bolts – or rather silicon and carbon – as we look at the circuit diagram in detail. This project attempts to include most aspects of computer control, and the board's devices can be used in many different experiments so you can build up a valuable knowledge of interfacing. For the first time in a major micro magazine we are presenting a coherent course of study in this important area.

The board is best split up into two parts: Control by the printer port and via the user port. Although the two sides may interact, they have to be linked up before this can happen – screw connectors running the length of the board allow the simple linking of the board's various components.

Figure I shows the parts of the circuit connected to the printer port. For simplicity I have not shown the lines joining all the points labelled PA0 and so on. PA0 stands for bit 0 on the A side of the port and, as it's normally used as a printer output on the BBC Micro, it's buffered so we can take a few liberties with what we drive.

The first four bits are connected to miniature relays – I could have made that all eight except for cost considerations. There is nothing preventing you from duplicating this part of the circuit, as the raw port outputs are also available on screw connectors.

There's nothing special about this circuit: A resistor limits the transistor base current and when the port is driven high current flows in the base permitting a larger flow in the collector. This pulls current through the relay's coil and so energises it. When it is turned off, the collapsing magnetic field causes a back EMF to be generated and this is caught by the diode across the coil.

Each relay has two sets of contacts with a normally closed (NC) and a normally open (NO) switch – *normally* refers to the un-energised state of the relay. So relay 0 is controlled by bit 0 on the printer port and the pair of common contacts are labelled C0A and C0B. This system of labelling allows easy identification of the relays and the bit that controls them.

The simple shorting Link 1 can be removed to prevent the relays from energising. This is desirable in case you are feeding signals specifically at the other components, especially when they are high speed.

The digital to analogue converter (D/A) is the low cost ZN429E8 which does not contain a latch because we don't need one – there's no point paying for it if we are not going to use it. If you

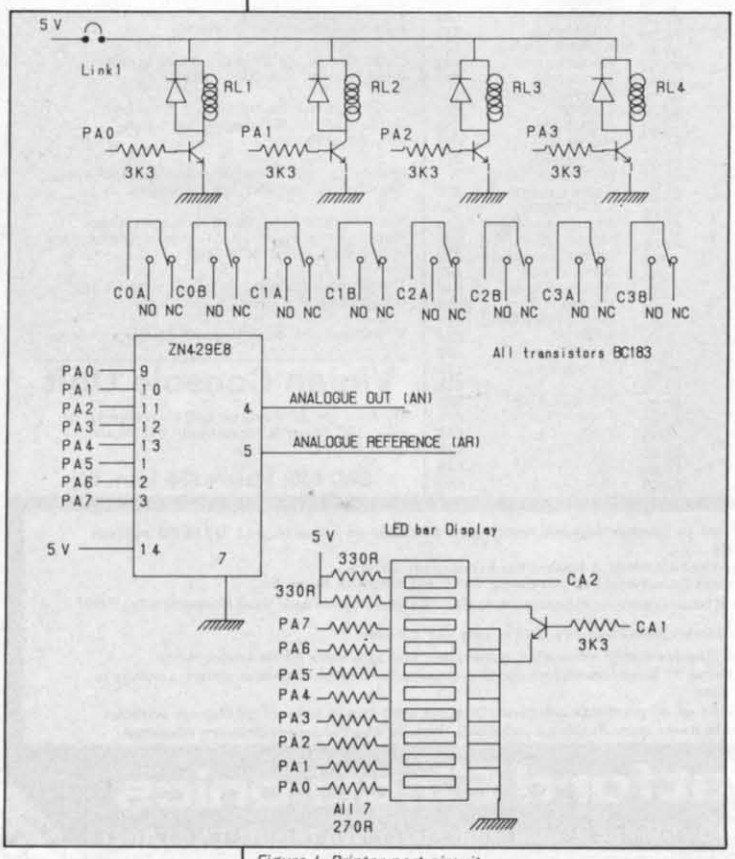

Figure I: Printer port circuit

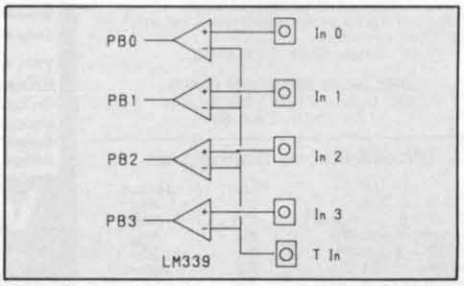

Figure II: Input buffering

like you can use any other type of D/A in its place providing you change the pin numbers. I have left the voltage reference input free so that we can connect a number of different ones to it.

Likewise, the analogue output is not buffered so the effects of buffering may be studied. Note that it has a high output impedence, which means that the voltage output will start to sag if it is loaded with anything greater than 680k. If you want a buffered output the uncommitted DC power amplifier can be linked to it.

Finally all the outputs drive an LED bar display – due to the port's buffering we can have the micro sourcing the current to light the LED. Similarly, CA2 is used as the printer strobe line and is also buffered, but CA1 is used for the busy input and so is not. As this line can be used either as an input or an output we must use a transistor to drive the LED – so the eight data lines and two control lines are all shown on the bar display.

The user port is not buffered, so each bit may be configured to be an input or an output. In the main we shall use them as inputs and the first four bits are buffered appropriately. If you cast your gaze on Figure II you'll see that an LM339 comparator is used for this purpose. This chip has the advantage of a variable transition threshold – a variable point where the micro switches from being a logic 1 to a logic 0. The threshold input is labelled *T in* and allows us to use analogue inputs or ones otherwise unsuitable for digital use.

The rest of the circuit is shown in Figure III. Bits 4 and 5 are connected directly to the micro and have no special use on the board, and the same applies to bits 6 and 7 – although links on the board can switch these to other places because they are used by the built-in timers.

One of the experiments we'll be able to carry out is to measure frequency, so I've included a gated input for bit 6 labelled G6. If you have a signal on this it will only get through to bit 6 on the user port if bit 7 is at a logic 0. Therefore Timer 1 can control exactly how long external signals can decrement Timer 2. This will be explained in more detail when the time is right.

In fact bit 6 can be switched between this gated input and the sensor of an opto-slot switch by using Link 2. Thus we can use the timer to count the number of times the beam is broken in the slot.

Bit 7 can be re-routed with Link 3 so that it feeds into an audio amplifier, but as its input is connected to the centre pin of the link alternatively it can be connected to CB2. This is where the shift register outputs its data and we can get some interesting noises here. The amplifier's input is also connected to an LED so we can see the data as well as hear it. The audio amplifier's output is connected to a super-thin loudspeaker – the one I have chosen has a stainless steel diaphragm for robustness.

The amplifier I have used is a little unconventional, although I have used it in several past projects. The LM3900 Norton amplifier works, not from voltage inputs as is conventional but from current. This results in an amplifier that is quite happy being driven from a single 5 volt supply.

As there are four in the one package I have built them up into signal conditioning amplifiers. Two – A1 and A2 – are AC coupled, the third – A3 – is DC coupled and the fourth is used elsewhere. They can be used to buffer the D/A converter or amplify the signal from a microphone.

A 3 watt 33R resistor is used as a heater. If this is connected up to the 5 volt supply it generates about three quarters of a watt in heat close to

Turn to Page 76 ▶

Arc, too

This project will also function on an Archimedes provided an Acorn I/O card is installed.

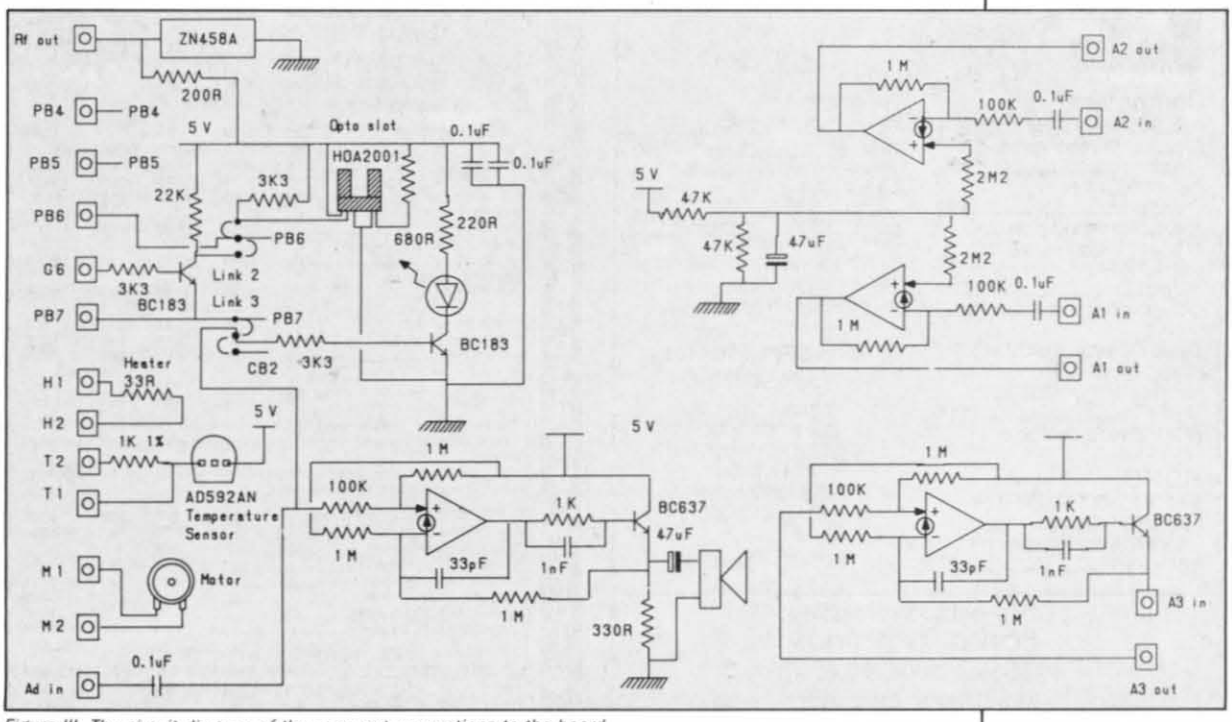

Figure III: The circuit diagram of the user port connections to the board

◀ From Page 75

this, so almost touching is positioned an AD592AN solid state temperature sensor. Then a motor is mounted so that a small fan can be fitted to blow on them both. Finally, the fan blades cut the opto-slot generating a signal as it rotates.

In order to supply a stable reference to both the A/D converter and the threshold input to the LM339 comparators, a reference voltage source in the form of the ZN458A is used. Again this is initially uncommitted to allow it to be used in a very flexible way.

I have avoided putting pin numbers on the circuit diagrams to prevent them looking cluttered. If you are making your own circuit up the pin-outs of all the major components can be found in standard data books. However the simplest way of making this circuit is to use the Body Build circuit board. For those with independent access to components or on a tight budget the printed board can be supplied separately as Body Build Pack 50a.

All the components except the board are in pack 50b and finally to connect it up to the computer you need a 26-way cable available as Pack 49 and – our old favourite – a 20 way cable available as Pack 2. There is a special discount price if all packs are ordered together. As well as the components, each contains a leaflet containing notes on the construction.

For those of you with solder phobia the whole shooting match is available ready assembled – bear in mind that these types of boards normally cost several hundred pounds.

Well there it is: Fire up your soldering irons and get constructing. Next month I will begin describing how to write the software to control all this.

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NEWSLETTER

Mass migration

To tie in with the announcement of a 1p/minute Prestel charge, MicroLink has now introduced a couple of additions to help Micronet emigres feel at home. The first, an extended Help system, lets users scan for any information on their chosen topic.

It's a big advance on the old systems, where finding the right answer was often more difficult than sorting out the problem that needed the help. Not everything is covered, but the new system is designed to complement the paper information provided to every subscriber.

The second addition is PCGold. This brings colour to MicroLink for the first time, if only for people who use IBM-compatible personal computers.

Menus and information is presented and colour-keyed, and other additions include a selection of reviews from Database magazines.

Response to the new features has been a bit muted from existing MicroLink subscribers, who have long been used to a text-based system instead of menus.

However, as an intermediate stage between the Prestel standard and the power of the MicroLink computer, PCGold should make the move from one to the other much easier.

Loadsamovers

The removal vans that daily ply the roads are hiding a big secret. Half of them are empty. It's no secret really; but when a van has delivered its load it's got to get back to base, and that could be a long journey with nothing on board.

Imagine the savings that could be made if there was some coordination. If a van was in the right area it could pick up a load for another company, saving petrol, time and money. Of course the big nationwide removal firms can do this already, but until now there's been no way for independents to pool their resources.

Now there's LoadLink. Run as a bulletin board on the MicroLink computer, it links up small removal and storage companies. If a subscriber has a load to be picked up from Scotland, he can put a message in the appropriate part of LoadLink.

All the other subscribers can read it, and if they've got a van in the area contact the company involved. They can then sort out all the details through electronic mail.

The service isn't limited to removal firms. Any company which thinks that it could benefit from the idea, and consequentially benefit everyone else in LoadLink, is welcome to join. So if you're regularly moving large amounts of anything around the country, it could be well worth while.

Potential LoadLinkers should contact Mike Starkey, of J.L.M. Communications Ltd who are organising the service. Their MicroLink ID is MAG70307.

Flights of fancy

A new category has been created on the Bulletin Board. Called AirLink, it came about after a selection of pilots, air enthusiasts and other flyers had just about taken over the Chatter section. To get rid of them and restore some semblance of order on the board, they were diverted to their own section.

But it's interesting stuff, as technical talk and stories mix with explanations and discussions about anything aviation. Guess which aircraft is "affectionately" known as the Technological Toothpick or the Screaming Anteater?

Or if that's too easy, do you know whether you're allowed to use a Z88 in flight? The answers to these, and many other, questions are all on AirLink.

Saving money

The best way of saving money on MicroLink is to reduce the amount of time you spend connected to the computer. I've been asked about this, and this is what I do to this end.

First, I always record everything I do while online to disc.

Next, I use MAIL READ ALL. This gets all my mail and displays it. It scrolls off the top of the screen too fast for me to read, but that doesn't matter 'cos it's all being saved to disc. Similarly, on the bulletin board I don't (usually) stop to read what's being said, I just plough on. Then I log off.

Offline, I look through my logfile with any old text editor or word processor. I compose replies to mail messages in a file in WPMAIL format (do INFO WPMAIL at the > prompt to find out about this), and bulletin board messages in separate files called BB1.DOC and so on. Then I go back online, send all my mail in one operation and send each file for the bulletin board.

Finally, every so often I clear out my file space by doing a >F command. This shows me all the files that take up chargeable space. I delete the ones I don't need by >DEL. Typically there's one called *MAILSAVE* which the computer insists on leaving about the place.

What other files you have depend on whether you're registered for telex or not, but any confusion can usually be cleared up with a quick message to MUG on the bulletin board. After all, that's what it's there for.

Old Mugshots never die...

...they simply hang around. Mugshot is the weekly (occasionally fortnightly) newsletter provided for MicroLink subscribers and published on the bulletin board. As more people get on the system, and discover MUG, they try and find out what's gone before. Reading through all the bulletin board messages is pretty tedious, but there is a scanning procedure for finding messages on the board.

After entering >BB, and 1 to access the Bulletin Board, type:

SC CA MUG FR MAG95816
SU MUGSHOT

This apparently incomprehensible string of gibberish breaks down to

SC	= SCan ; show me the short details of messages
CA MUG	= CAtegory MUG ; only show messages in category MUG
FR MAG95816	= FRom MAG95816 ; only show messages from MAG95816
SU MUGSHOT	= SUbject MUGSHOT; only show messages with Mugshot in the subject field.

You'll see a list of numbers; typing these in as READ number will display the message in question.

Suggestions of material for inclusion in the MUG Newsletter should be sent to Rupert Goodwins on MAG95816

Into action with a packing case

The Mad Hatter delves deep into Dungeon Adventure

PROBLEMS abound in adventures, and one of them is selecting your favourite game. I am torn between three – Robico's Enthar Seven and Level 9's two classics, Lords of Time and Dungeon Adventure. They all vie to be my all-time favourite and one day I'll reveal which it is.

Quality counts, they say, and both software houses have put a great deal into their games. The main distinction is that Robico has always continued to support the BBC Micro whereas Level 9 for a time sought pastures new. I happen to be an admirer of loyalty.

However, many of you have found **Dungeon Adventure** not only a challenge but a source of real entertainment, so Stuart Booth and I are going to lay bare the innards of this fascinating game during the next month or two.

It is the final adventure in a trilogy written by Peter Austin of Level 9. The first, **Colossal Adventure**, was based on the original adventure game by Crowther and Woods' – Colossal Cave.

The sequel, **Adventure Quest**, took things a bit further and the follow up, **Dungeon Adventure**, brought everything to a satisfying and amusing conclusion.

You start by looking at the driftwood and the packing case, and here you must follow your resident maniac's instructions for a bit since I prefer my own approach to the opening moves.

ENTER the packing case, and pull and push this and that, to prepare things if you need to be revived. After this, you can happily begin your explorations and use the storage room inside the packing case to dump things.

The first area to explore is outside: There is a move counter working against you here in the form of the setting sun, so it's essential to explore carefully and then run through the area as

Hatter's Helpline

Andrew Connell wants to know how to get into the Chapel in **Gisburne's Castle**. *USE Small Key* is the input required – it's in the cellar.

Chris Bailey has written to offer help to Anthony Graham stuck in Micro Power's **Adventure**. If he kills the frog, he'll find the princess in the magician's bedroom. And if he loses her again, she'll be found in the bedroom to the west of the diamond.

The following notes on **Adventure** are thanks to Anthony Gordon. You must *leave* the Ming vase in the left luggage office – if you drop it you are left with a smashed vase.

The ring is in the dungeon. To get thrown there try to steal a treasure, but make sure you've got the keys to get out. If you attempt to kill the princess, you'll be thrown in the dungeon, and your keys will be confiscated as additional punishment.

After 99 moves, two features come into play: Various messages are generated at random and these can all be ignored except the one saying a spider is present. If you don't kill the spider with the axe when the message appears, you'll die if you stay there or return to it later.

Secondly, if you enter the spider's lair you'll be killed without being given a chance to kill the spider. You must therefore dispose of it within 100 moves – you need to do this anyway to find the ruby.

Finally, the following are red herrings: Scarf, cage, oil, slipper and dragon.

Michael Jeffrey is puzzled about one or two features in the Level 9 adventure **Lords of Time**: The poor wretch in the stocks is merely scenery but don't torment him. Similarly, the two guards in the Roman era don't have any active part to play in the solution.

Michael is puzzled about the best way to complete the last section of this adventure, too: I am going to feature a full solution to quite soon.

K. Gupta has been having a bit of trouble with **Sphinx Adventure** and the vampire. From the treasury go W, U and S to find the stake and that will mean the vampire has had his chips. To discover the mithril ring, he needs to wave the wand in the fairy grotto. Finally, the matches are sure to give the serpent heartburn!

Anthony Bristow is in trouble in **Village of Lost Souls**. He doesn't make it quite clear whether his version is the original Magus one or the enhanced version more recently released from Robico, but I think the answers are the same for both versions:

To put out the fire in the hut, which needs to be

economically as possible.

Take the driftwood and the case and travel from the mud bank to the east/west road via the stone bridge. Go E, E and N, N to the giants' clearing and climb the tree. Take the berry and drop it – you won't need it any more.

Climb back down the tree and rub the belt – rubbing things enables you to wear them, when possible, in one move. Go W along the road until you find the poppy seed, take it back to the stepping stones and wave it to deafen yourself to the siren's song. After that you can go N and take the mirror, which will enable you to go E along the forest road and reflect the sleep spell.

Go S and take the coins, wand and dice, then go back N, W, W and S to get to the mound below the huge nest. Wave the seed here again, and you can safely collect the egg from the nest.

After this you need to go W and W to the monoliths. Reply yes to Rakshasa's question and, provided you have your own dice, you'll win! This complete's the revival spell.

Finally, go back to the south end of the island and throw any six objects to preoccupy the killer willow. Go N for the axe and hit the tree. Relent when the dryad intercedes. Now you can collect the six discarded objects and prepare to enter the cave system via the tongue bridge.

So that's your opener for this month – there's much more to follow.

I have had a number of queries about the **Adventure Anthology** compilation tape advertised in *Electron User*. On it are five titles: **Golden Crown, Dracula, Craal, Necromancer** and **Johnny**.

My colleague Pendragon tells me that they run perfectly well on the BBC Micro. Priced at £4.95 the tape is available by mail order from Database Publications – quote reference 3044.

On a final note, due to a lack of nimble-fingeredness please send any questions about arcade adventures to Hac Man – we had a long talk and decided once and for all that *he'll* be dealing with them.

See you next month. Until then, happy adventuring.

Problem Corner

Todd Newman has a pile of questions about adventures I've never even heard of. In *Buckaroo Banzai* how does he get the quartz from the ledge and where is the catalyst?

Where do you find an arrow to kill the dragon in *Ebony Tower* – and how do you open the door in the open-air temple? Finally, in *Xanadu Cottage*, how can Todd find out the cash-card number?

Charles Ewan has written in with some queries about *Franklin's Tomb*: How do you raise the pulley room and what are the black wand and knuckle duster for? I've only been sent a partial solution to this adventure and it doesn't deal with these matters.

Can anyone help their struggling adventurers please?

done quite early on in the game, you need to fill the chalice with holy water from the font in the church and throw it on the fire.

The sigil of talent in the gate of the building repels you until you push the seal which you are told about in the hut.

To enter the crypt you need the pliers which are in the smithy workshop. Anthony also wants to know what to put on the altar: There are five objects – the necklace, crucifix, reliquary, circlet and Sceptre.

Gollum kindly sent me a solution to **The Hunt**, but has a problem with the bees in **Village of Lost Souls**. He's got the pipe and tobacco – well done – but also needs the veil and gloves, and must make sure the pipe is lit before trying to open the hive.

Charles Ewan has some questions about **Sorcerer of Claymorgue Castle**: Ian Weston's solution suggests that you should *wring* the damp towel, *look* at the Dragon, *cast* the permeability spell, and I notice that Ian goes to the fountain while carrying the magic mirror.

E. Bowen can't open the Chest in Robico's **Project Thesius** – superb game – even though he's had a look at the page torn from the telephone directory – the correct number is 640. simply go to the cave, dig up the chest and type that number.

Bob McMurray wrote in recently about **Woodbury End** and it may help others if I point out that the adventure is divided into two tasks. First you need to bring the children back to normal by attracting them to the village green at the right time, and you must eliminate the five aliens and their ship.

Ray Lawrence has a few problems with that beautiful spoof, **Bored of the Rings** part 2. He's found the poster, the treasure in the secret room and got the key and the coin by inserting the vending machine battery. But now he's stuck.

I have a feeling that Ray hasn't bought the map from the pixie – using the coin – so as to find his way out of the maze. You *must* be carrying the map to escape from it.

Chris Greer has sent me a map and solution to **Adventure Quest** and a **Countdown to Doom** query. Please note, this answer applies to the old version of the game, not the recently enlarged one.

To get to the glacier, you need to go UP from the landing area, W and W then fire the phaser. Getting down the volcano involves obeying the beeps in the machine room (3=E, 6=S, 9=W and 12=N) then going UP twice and then SW,W,NW and SW home to the engine room.

Barbara Gibb offers help once more: This time to Jonathan Collier, stuck in **Dodgy Geezers** close to the finish.

He needs to exchange the crate of gold for the crate of nails, load the gold into the car and head for the jetty where a yacht is moored. The final command is *Read newspaper*.

Andrew Thacker has a few problems in **Elite**, and appears to have achieved Deadly status without encountering the first mission. The only advice I can offer is to start again at the beginning. If he does that, and follows the advice I gave in the January to March issues of *The Micro User*, he's bound to run into it.

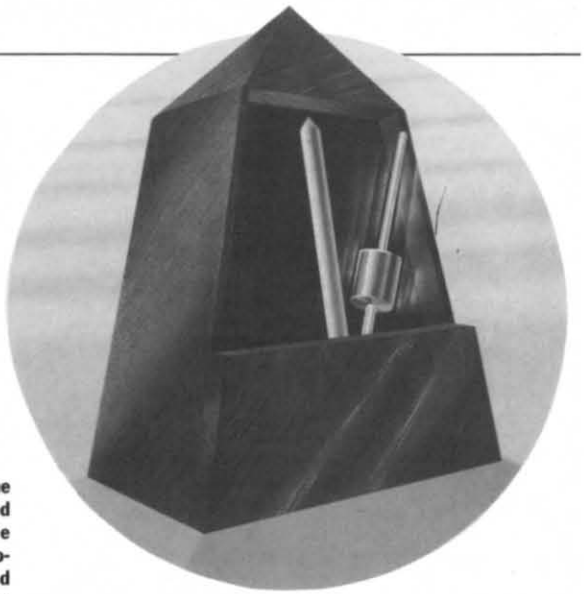
Hall of Fame

Congratulations to 11-year-old Steven Bence for sending me the first full solution to *Worm in Paradise*.

B B+ M

Making music

Ian Waugh continues his series on using Ample...



LAST month we produced a four-bar bass line using Ample's Staff Editor. When you typed MAKE you saw some lines scroll up the screen. This is Ample's natural form of notation, and we can examine it in the Notepad editor. Boot the system and load the program you saved last month with:

```
"prog"LOAD
```

Type SHOW or press f5 to check that the words are there then select Notepad from the menu.

Notepad is a multi-purpose editor that handles data as text rather like a word processor. It's far more flexible than the Staff Editor and can be used to enter music lines in Ample notation, arrange sections of music into a playing order and form instrument definitions.

As in the Staff Editor, MAKE produces a word containing the text in the edit area but, unlike the Staff Editor, the definition is not restricted to a line of music. The contents of the text area is checked to ensure it is a valid word definition and an error will be reported if it isn't.

At the top of the screen you will see:

```
got "" to make "newword"
```

This tells you the last word called into the editor – the *got* part – and the name of the word being edited – the default is *newword*.

Load your bass line into the editor with:

```
"bass"GET
```

You should see something like Figure I. The per cent sign – % – marks a line as a comment like REM in Basic and the first line suggests that the word was made in the Staff Editor. It need not have been, however, as you could obviously type that line directly into the Notepad.

Although data is transferable between modules, to load a Notepad music definition into the Staff Editor it must have that first line and other formalities of staff notation must be observed, too. Words produced by any module, however, can be displayed in the Notepad.

Let's examine the word: SCORE prepares a part for music event words and basically resets everything to default values. This is how Ample translates the clefs from the Staff Editor.

The next item is K(-B)K which sets the key signature – the required sharpened or flattened notes are put inside K(...)K. In this example the B has been flattened to form the key signature of F major or D minor. Interestingly, you can sharpen and flatten any combination of notes in Ample, so it's quite easy to construct your own scales. For example, the following definition will produce a gypsy-type scale:

```
K(-B-D-G)K
```

The next word is a comma – , – which is preceded by a value which sets the length of the notes. In this case it's 48, which in Ample is normally taken to be a crotchet. 48 is a useful

```
got "bass" to make "bass"
trying "RETGATE"
%STAFF
SCOREK(-B)K48,4BAR49=L
-2:12,D/!D/c/D/'F//d-dcD/||
-2:12,D/!D/c/D/'a//g-gAg/||
-2:12,D/!D/c/D/'F//d-dcD/||
-2:12,D'A/d'G/d'F/d'G/d/c/||
%
```

Figure I: bass word

Notepad Editor controls	
General	
f1	Play music
f2	Switch between text and panel modes
Text Mode	
Delete	Delete character before cursor
Copy	Start copying
Return	Move to start of next line/end copying
f6	Insert line before cursor
f7	Delete current line
f8	Insert space before cursor
f9	Delete character at cursor

Panel Mode is used for editing instrument definitions.

Ample Notation

Notes are represented in Ample by their letter names, A to G. A lower-case note will move down in pitch from the last note and an upper-case note will move up in pitch. The same letter and case plays the same pitch. To get an extra change of octave the pling – ! – is placed before the second note.

To make a note longer by one beat the hold is used –/.

Words	Explanation
,	Set note length
:	Set octave number
/	Hold last musical event for one beat
!	Move an extra octave up or down
↑	Rest
↑;	Chord rest
ı	Bar line
'	Accent next note
(	Start additional chord notes
)	End additional chord notes
˜	Slur
–	Flatten next note
+	Sharpen next note
=	Naturalise next note
@	Set transposition in semitones
%	Start comment line
SCORE	Prepare for music words
K(	Begin key signature
)K	End key signature
BAR	Set bar length in beats

length because it can be divided into triplets, sextuplets and right down to hemi-demi-semi-quavers. However, you can set whatever note length you wish.

BAR is used in conjunction with the note length setting to form the Ample equivalent of a time signature: 4BAR says there are four note lengths per bar. If you alter the 4 to a 3 and try to play the word you'll get a Bad bar error because bar lines have been inserted after every four beats.

The last item on the second line is the volume setting, with which you'll be familiar from the Staff Editor.

There are four remaining lines, each holding note data for one bar. They're very similar, so we'll just look at the first one, the colon – : – which sets the octave. For the one on middle C we'd use zero, but we're two octaves down from that. The next word is the comma again, and this sets the following note durations to a semi-quaver. The system has used this value because a semiquaver is the shortest note in the bar.

The first note is D, two octaves below middle C. It is two semiquavers long. The next note is D again but an octave higher. Then we move down to C, up to D and up to F. That has been accented by the single quote mark before it.

Then it's down to D and ˜ – which appears as the mathematical divide sign in Mode 7 – to indicate it is tied to the next D. The tie was necessary in staff notation, but you will see that it is redundant in Ample notation and dd could be replaced by d/ – see the panel on Ample notation for further explanation of ˜ and /.

However, the ˜ has another use in Ample – as a slur which affects the note following the slur symbol, but it has no effect on the previous note. All it does is to join the sound of the second note to the first one. It does this by not retriggering the note envelope so the only change you hear is a variation in pitch.

On a piano, for example, it is impossible to play a note without triggering the envelope. In Ample, however, you can slur any note even with the upright piano instrument definition.

Finally, the last symbol on the line is the bar line marker.

We'll use the Notepad now to enter a chord accompaniment. In Ample, a chord is written as a main note plus up to seven additional notes in brackets. We will use three-note chords and you can see the word definition for *chordriff* in Figure II.

Usefully, a single slash will extend the duration of all the notes in a chord which saves us writing /(//). A chord rest is signified by ↑ ; which, in this case, is the equivalent of ↑ (↑ ↑).

Type in chordriff, NAME it, MAKE it then enter:

```
3 VOICES Elguit
```

This allocates three voices to the part – one for each note in the chord. Enter edit mode and press f1 to play it. Replace some of the holds with chord rests to knock holes into the piece. Replace chord rests with holds. See how it alters the feel and the rhythm. If you alter the total duration of the word, however, it won't play in time with the other parts.

Next we'll use the Notepad to construct a lead part. Nothing so simple as another line of music – this time we'll make the micro do some work. In Ample you can apply programming constructions to music lines.

Type CLEAR or press f4 to clear the Notepad, enter *rand1* as shown in Figure III, NAME it and MAKE it. This word uses three of Ample's pro-

Turn to Page 82 ▶

```
got "chordriff" to make "chordriff"
trying "RETGATE"
12,
-1: ↑;/ A(DF) ↑;/ A(DF)
    ↑;/ C(EG)/////↑;/
-1: ↑;/ A(DF) ↑;/ A(DF)
    ↑;/ g(CE)/////↑;/
-1: ↑;/ A(DF) ↑;/ A(DF)
    ↑;/ C(EG)/////↑;/
-1: ↑;/ A(DF) ↑;/ g(+CE)
    ↑;/ f(AD)/////↑;/
%
```

Figure II: chordriff word

```
got "rand1" to make "rand1"
trying "RETGATE"
12, 49=I
↓RANDL
IF( 1:↑↑D/c///↑ )ELSE( 0:DFGA/D/↑ )IF
%
```

Figure III: rand1 word

◀ From Page 81

```
got "rand2" to make "rand2"
trying "RETGATE"
----------------------------------------
12, 49=L
1RANDL
IF( 1:D/!D/!!!! )ELSE( 1:Dc/a/yf! )IF
```

Figure IV: rand2 word

```
got "random" to make "random"
trying "RETGATE"
----------------------------------------
1RANDL IF( rand1 )ELSE( rand2 )IF
```

```
got "lead" to make "lead"
trying "RETGATE"
----------------------------------------
BFOR(
1RANDL IF( 12,!!!!!!!! )ELSE( random )IF
)FOR
----------------------------------------
%
```

Figure V: random word

Figure VI: lead word

gramming words. RANDL produces a random number between zero and the number preceding it. Try this in command mode:

```
5RANDL NOUT
```

NOUT prints the number on the screen in decimal. The next part of the definition is the equivalent of Basic's IF THEN ELSE. Ample's IF(...)IF construction carries out the instruction inside brackets only if the flag – the number preceding it – is ON and it treats all non-zero values as ON.

The)ELSE(construction offers an alternative path for the program to follow if the flag is OFF. Therefore, if 1RANDL returns a 1 the first sequence of notes will be executed, if it returns 0 the second sequence will be used.

Now enter rand2 from Figure IV and random from Figure V. Finally enter lead from Figure VI – this starts the whole random ball rolling.

Now that we have our basic music material we need to arrange the whole piece. We'll do that in detail next month but so you can hear what you've done so far construct the following words:

```
"part1" [SCORE 1VOICES Slapbass bass]
"part2" [SCORE 3VOICES Elguit chordriff]
"part3" [SCORE 1VOICES Ringsyn lead]
```

Enter RUN and the system will play them together for you. So until next month, happy listening.

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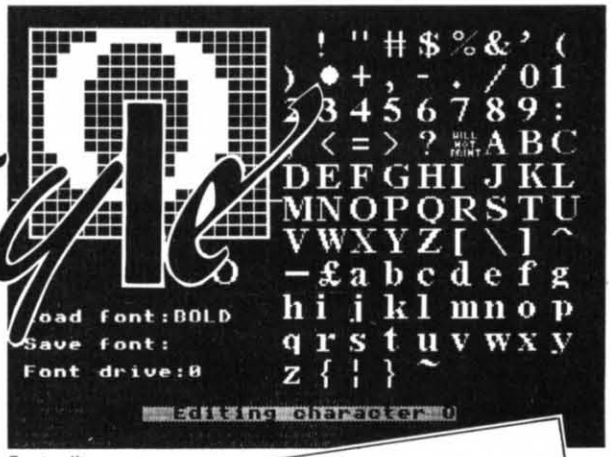

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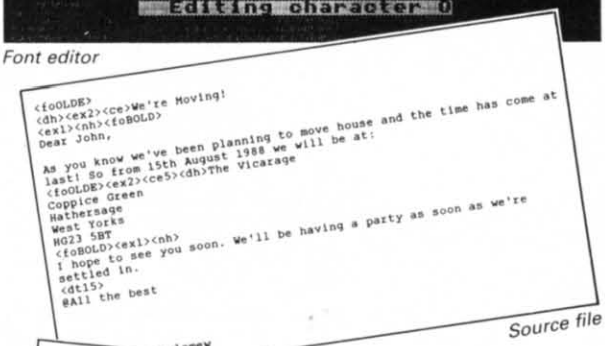

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Example output

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PROGRAM Library No.19

Compiled by Steve Turnbull

SOMETIMES there's no short way of producing a result. This month we have the complete string rolling routine which shows just how far we can go from simple Basic routines still using legal software. The routine lets you scroll single or double height characters without flicker.

Another interesting program is Binary Print for producing a binary version of a number – it's an excellent and well thought out example of code optimisation.

Title: Roller
Language: 6502
Author: Phil Bender

Here's a program to answer the challenge from Library No.17 in July. It will roll complete strings of up to 129 characters – and it'll do it in double height too. The double height print facility can also be called separately.

To use the program first set the print position with:

```
PRINTTAB(x,y);
```

Then call the *roll* function with three parameters – the old string, the new string and a flag. If the flag is 0 the printing is normal height otherwise it is double. The strings should be the same length – you can pad with spaces if necessary – otherwise strange characters will appear.

The delay routine is designed to pause for a time inversely proportional to the length of the string so that each scroll takes about the same time – a string of 100 characters only takes about four times as long as a string of one character.

By changing two lines:

```
380  LDA #7:STA index
400  JSR delay:DEC index
```

you can make the text scroll downwards.

To use the double height facility alone set the print position as above and call *double* with a single string parameter.

```
 10 REM Roll utility
 20 REM Single/Double height
 30 REM by Phil Bender
 40 MODE1:PROCass
 50 VDU23;8202;0;0;0;0;
 60 nm%=0:db%=1:J%=10
 70 a$="The MICRO USER":K%=10
 80 b$="is wonderful! ":L%=15
 90 COLOUR2:PRINTTAB(J%,K%)a$
100 COLOUR1:PRINTTAB(J%,L%);
110 CALLdouble,b$:REPEAT
130 PROCr(2,J%,K%,a$,b$,nm%)
140 PROCr(1,J%,L%,b$,a$,db%)
150 PROCr(2,J%,K%,b$,a$,nm%)
160 PROCr(1,J%,L%,a$,b$,db%)
170 UNTIL FALSE:END
180 DEFPROCr(C,X,Y,a$,b$,N%)
190 COLOUR C:VDU31,X,Y
200 CALL roll,a$,b$,N%:ENDPROC
210 DEFPROCass:DIM code &200
220 stra=&70:strb=&72:temp=&74
230 osbyte=&FFF4:osword=&FFF1
240 oswrch=&FFEE:blk=&600
250 FOR L%=0 TO 2 STEP 2
260 P%=code:[OPT L%
270 .double JSR getadd
280  LDY #0:STY temp:STY index
290  INY:STY flag:JMP print
300 .roll JSR getadd
310  LDA #8:STA count
320  LDA #1:STA index
330  LDA #134:JSR osbyte
340  STX xpos:STY ypos
350 .loop1
360  LDA #31:JSR oswrch
370  LDA xpos:JSR oswrch
380  LDA ypos:JSR oswrch
390  LDY #0:STY temp:JSR print
400  JSR delay:INC index
410  DEC count:BNE loop1:RTS
420 .getadd
430  LDA blk+1:STA temp
440  LDA blk+2:STA temp+1
450  LDY #0
460  LDA (temp),Y:STA stra
470  INY:LDA (temp),Y
480  STA stra+1:INY:INY
490  LDA (temp),Y:STA len
500  LDA blk+4:STA temp
510  LDA blk+5:STA temp+1
520  LDY #0
530  LDA (temp),Y:STA strb:INY
540  LDA (temp),Y:STA strb+1
550  LDA blk+7:STA temp
560  LDA blk+8:STA temp+1
570  LDY #0
580  LDA (temp),Y:STA flag:RTS
590 .print LDY temp
600 .loop2 LDA flag:BEQ here
610  JSR bigprint:JMP cont
620 .here JSR normprint
630 .cont INC temp:LDY temp
640  CPY len:BNE loop2:RTS
650 .getchars
660  LDA (strb),Y:STA new
670  LDA (stra),Y:STA old
680  LDX #new MOD256
690  LDY #new DIV256
700  LDA #10:JSR osword
710  LDX #old MOD256
720  LDY #old DIV256
730  LDA #10:JMP osword
740 .bigprint
750  JSR getchars
760  LDA #23:JSR oswrch
770  LDA #254:JSR oswrch
780  LDX index
790  LDA old+1,X:JSR oswrch2
```

Title: Binary Print
Language: Basic
Author: Jeremy Benson

BBC Basic is full of useful print and string handling facilities, for example converting numbers from decimal to hexadecimal. But displaying numbers as their binary equivalent is not provided as standard, probably because they take up so much space on screen – a full 32 bit integer occupies two-thirds of the Mode 7 screen width.

The routine given here produces a binary string of a number to a specified length – if the string length exceeds the width the most significant digits will be lost.

The heart of the routine is *B%ANDN%* at line 90, where *B%* is used to mask a bit of *N%*. If the bit is set to zero that is the result, otherwise the answer is non-zero. From this we can generate either –1 or zero and by subtracting this from 48 we get 48 or 49 – which just happen to be the Ascii values of zero and one.

The character is then poked into memory to produce a string that can be read out directly using *$C%*. The routine uses a great deal of optimisation to drive it as fast as possible – an 8 bit binary number can be generated in just 3.22 hundredths of a second.

String handling is immensely slow even in BBC Basic, so it has been avoided by poking directly into memory. The most obvious method of altering the mask value – *B%* – is to use:

```
B%=2^(F%-I%)
```

But calculating exponentials is very slow: Another method is to multiply:

```
B%=B%*2
```

which is 17 times faster and still produces the required sequence – 1,2,4,8,16 and so on. But there is one further stage:

```
B%=B%+B%
```

This produces the right sequence and is twice as fast again. The final optimisation is using *C%* instead of &700 – it takes three times as long to decode four hex characters than it does to get the value from a system variable.

```
 10 REM Binary Print
 20 REM by Jeremy Benson
 30 TIME=0:FOR N%=0 TO 255
 40 PRINTFNbin(N%,8):NEXT
 50 PRINTTIME/256:END
 60 DEF FNbin(N%,F%)
 70 LOCALI%,B%,C%:B%=1:C%=&700
 80 FOR I%=F%-1 TO 0 STEP-1
 90 C%?I%=48-((B%ANDN%)>0)
100 B%=B%+B%:NEXT:C%?F%=13:=$C%
```

Get it right!

10 = 0 0	60 = B588 2
20 = 0 0	70 = FF7D 9
30 = 52D3 3	80 = 80F8 0
40 = FBAD 1	90 = AF9B 9
50 = 6602 3	100 = 24B9 B

```
800  LDA old+2,X:JSR oswrch2
810  LDA old+3,X:JSR oswrch2
820  LDA old+4,X:JSR oswrch2
830  LDA #23:JSR oswrch
840  LDA #255:JSR oswrch
850  LDA old+5,X:JSR oswrch2
860  LDA old+6,X:JSR oswrch2
870  LDA old+7,X:JSR oswrch2
880  LDA old+8,X:JSR oswrch2
890  LDA #254:JSR oswrch
900  LDA #8:JSR oswrch
910  LDA #10:JSR oswrch
920  LDA #255:JSR oswrch
930  LDA #11:JMP oswrch
940 .oswrch2
950  JSR oswrch:JMP oswrch
960 .normprint
970  JSR getchars
980  LDA #23:JSR oswrch
990  LDA #255:JSR oswrch
1000 LDX index
1010 LDA old+1,X:JSR oswrch
1020 LDA old+2,X:JSR oswrch
1030 LDA old+3,X:JSR oswrch
1040 LDA old+4,X:JSR oswrch
1050 LDA old+5,X:JSR oswrch
1060 LDA old+6,X:JSR oswrch
1070 LDA old+7,X:JSR oswrch
1080 LDA old+8,X:JSR oswrch
1090  LDA #255:JMP oswrch
1100 .delay LDA #0
1110  SEC:SBC len:LSR A:TAX
1120 .loop3 LDA #255
1130  SEC:SBC len:LSR A:TAY
1140 .loop4 DEY:BNE loop4
1150  DEX:BNE loop3:RTS
1160 .index BRK:.count BRK
1170 .len   BRK:.flag  BRK
1180 .xpos  BRK:.ypos  BRK
1190 .old   OPT FNds(8)
1200 .new   OPT FNds(9)
1210 ]:NEXT:ENDPROC
1220 DEF FNds(N%):P%=P%+N%:=L%
```

Get it right!

10 = 0 0	190 = A6E1 5	360 = A90D C	580 = B991 0	800 = CC6 D	1020 = 346C 2
20 = 0 0	200 = 1E96 5	370 = CA51 F	590 = 4A6 E	810 = A23A 2	1030 = 4F0D 7
30 = 0 0	210 = 700C 4	380 = 64AD 2	600 = 1EE3 F	820 = DAAD 2	1040 = 3F0B 6
40 = BE20 0	220 = E071 5	390 = 69E4 F	610 = 3999 B	830 = EA84 C	1050 = 446A D
50 = 7A0C F	230 = 6352 A	400 = 1B3D F	620 = 7D37 5	840 = AC49 5	1060 = C9C9 5
60 = 4AE7 3	240 = B319 2	410 = E59A 7	630 = A645 2	850 = 7451 3	1070 = B2A8 2
70 = F45A 8	250 = AAB9 1	420 = 3EBF 8	640 = 9308 0	860 = 9774 A	1080 = 29C5 6
80 = 84B2 5	260 = 7CBB 3	430 = B119 6	650 = B020 B	870 = 3988 E	1090 = 366 F
90 = CAC9 3	270 = DDAE 6	440 = 57D5 7	660 = 5319 1	880 = 665A C	1100 = 4AC5 1
100 = 112F 3	280 = D365 E	450 = 9CF1 2	670 = F97C 6	890 = AF3C 5	1110 = 513B 0
110 = F267 E	290 = 9F15 2	460 = EF97 A	680 = 99C9 C	900 = 6697 2	1120 = 9DDF 0
130 = A01B 1	300 = F79D 4	470 = 9B7E 2	690 = ACE8 E	910 = 20BE 4	1130 = 411A 2
140 = 47B6 8	310 = 34CD B	480 = 310A D	700 = D042 3	920 = AC49 4	1140 = 45D7 1
150 = C956 C	320 = 1735 3	490 = 9D3C E	710 = 21B2 8	930 = 8CE4 A	1150 = 280E 3
160 = 2EFB B	330 = B1AE 3	500 = 7369 4	720 = 1493 0	940 = D410 3	1160 = 639A 7
170 = DADE 6	340 = 7C1C 7	510 = 5F9E F	730 = 7F6D 2	950 = 286D A	1170 = 6BEC 2
180 = 5600 3	350 = 3311 E	520 = 9CF1 B	740 = 784D F	960 = 8B5F B	1180 = 1E38 C
		530 = 611E C	750 = 5241 C	970 = 5241 C	1190 = F96C B
		540 = 56EC 0	760 = EA84 6	980 = EA84 0	1200 = A094 4
		550 = C2A6 6	770 = AF3C 8	990 = AC49 A	1210 = 953B D
		560 = 4A97 5	780 = 5985 E	1000 = 5985 9	1220 = 532 B
		570 = 9CF1 1	790 = EFE3 D	1010 = B9CF 9	

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3.88(3)

B B+ M

From *FX to osbyte

Mike Bibby learns to read as well as write...

LAST month we had a look at the *FX commands, and discovered they were a powerful way of interfacing with the operating system. And I also left you with a question: Why do we call them *FX commands at all? Well, it wasn't a trick question, honest, but one of our editors saw the answer without realising it and gave it away in the headline: Special effects – it's a pun...

And unquestionably that's what we use *FX calls for. We saw that among other things, they allow us to discover what version operating system we have, change auto-repeat rates, and gain access to buffers – which led us to our party piece, a self-running program.

We also noted that *FX commands call the osbyte routine at &FFF4. They can be followed by three parameters, the values of which are passed to the *A*, *X* and *Y* registers before entering osbyte.

So far though, we've only used osbytes to pass, or write information. Sometimes we want to read information from the system, such as discovering what mode we're in. For this we have to leave *FX calls, which are strictly one way, and use calls to osbyte.

The information we want will be passed back via the *X* and *Y* registers – and sometimes the Carry flag. This is how we did it in last month's program TESTER.

TESTER used the function USR to pass information to and from osbyte. If you haven't typed it in, the panel on USR should give you enough information to create your own program...

Let's look at an osbyte call that returns some information: &85. This tells us what HIMEM would be set at for a particular screen mode, specified by the number in the *X* register. It returns the address in the *X* and *Y* registers – low byte in *X*, high byte in *Y*.

Rather than use TESTER to demonstrate it, we'll see how it can be done simply with some machine code. As Listing I shows, it's often as easy as doing it fully in Basic.

There are other osbyte calls that feed back information in a similar way. One that's often underestimated is &87. You don't need any parameters for it, just call osbyte and *X* returns the Ascii code of the character at the cursor. Often overlooked, though, is what *Y* returns: It's the current screen mode.

As an exercise you could try combining osbyte &87 with osbyte &85 to determine the current start of screen memory. Don't worry if you can't manage it, though – osbyte &84, with no entry parameters, returns the address in *X* and *Y* in the same way.

So now we've seen we can use osbytes to read data as well as write it. In fact there's a whole class of calls from &A6 onwards specifically designed to let you read or write the system variables.

The system variables are memory locations that hold values vital to the operating system. It's here you'll find the mode to start up in, the value of the key that means Escape, where to jump to on Break, what the keyboard status is ... and lots more.

You can both read and write to these locations via osbyte: Each has its particular call.

Whether you're reading or writing is determined by the values of *X* and *Y* when you enter osbyte. The rules are: To write to the location *X* must contain the value you want written, and *Y* must be zero. To read from the location *X* must be zero and *Y* must be &FF.

Seems bizarre? Well the operating system performs the following steps when handling osbytes &A6 and above:

- Read the old value of the relevant system variable.
- AND this with *Y*. If you're writing *Y* is zero so your old value becomes zero. If not *Y* is &FF, which leaves the old value unchanged.
- Take the result from above and EOR it with *X*. If you're writing, *X* contains the value you want to write and the last result was zero, consequently the value in *X* – the new value – is the answer. If

Turn to Page 88 ▶

```
   10 REM Listing I
   20 MODE 6
   30 osbyte=&FFF4
   40 mode=&70
   50 lo=&71
   60 hi=&72
   70 code%=&900
   80 FOR L%=0 TO 3
   90 P%=code%:[OPT L%
  120 LDA #&85
  130 LDX mode
  140 JSR osbyte
  150 STX lo
  160 STY hi
  170 RTS
  180 ]:NEXT
  200 REPEAT
  210 INPUT"Which mode do you
 want",mode%
  220 ?mode=mode%
  230 CALL code%
  240 address%=?lo + 256*?hi
  250 PRINT "Mode ";mode%" st
arts at &";~address%
  260 UNTIL FALSE
```

There's a whole class of calls . . . designed to let you read or write the system variables

◀ From Page 87

you're reading, the last result was the old value and EORing it with *X* – which is zero – doesn't change this.

● Take the last answer and store it in the location. If you're writing, that last answer was the new value of *X*, so the location assumes that value. If you're reading, you write the old value into the location so nothing changes. Either way you're successful.

As a byproduct of all this, whether you're reading or writing, *X* contains the old value of the location and *Y* contains the next.

Complicated as all this may seem, you've probably used this method of writing quite a lot. For instance osbyte &C9 (201) is frequently used to disable the keyboard with:

```
*FX201,0
```

Since *Y* isn't specified it's taken to be zero, so the above could read:

```
*FX201,0,0
```

As *Y* is zero, we must be writing the value of *X* – also zero – to the location that enables/disables the keyboard. And a value of zero there disables the keyboard – so make sure your program has a *FX201,1 to turn it back on.

Another example of this type of osbyte is the old favourite *FX254. To understand this you must know that 64 is &40 in hex – the high byte of &4000 or 16k. Similarly 128 – &80 – is the high byte of 32k.

Try entering:

```
*FX254,64
```

Then press Control+Break and see what start-up message you get. Next enter:

```
*FX254,128
```

press Control+Break again and check the message.

Perhaps you can guess that – since *Y* is zero – this osbyte call is writing to the system variable that tells the system how much ram it has.

These osbytes can read the system variables as well: Just enter the call with *X* at zero and *Y* at &FF and when you return *X* will contain the value of the corresponding variable.

But how does the system know where to find its variables? The answer should be obvious by now: It uses an osbyte call – &A6 – the first of our read/write specials. Listing II uses it to determine the location of the system variables. An offset address read by &A6 is stored as a low byte, high byte pair.

The operating system adds the osbyte numbers &A6 and over on to this offset to decide where in memory the system variable it's dealing with is found.

```
  10 REM Listing II
  20 MODE 6
  30 osbyte=&FFF4
  40 sys_lo=&70
  50 sys_hi=&71
  60 code%=&900
  70 FOR L%=0 TO 3
  80 P%=code%:[OPT L%
 110 LDA #&A6
 120 LDX #&00
 130 LDY #&FF
 140 JSR osbyte
 150 STX sys_lo
 160 STY sys_hi
 170 RTS
 180 ]:NEXT
 200 CALL code%
 210 start%=?sys_lo + 256*?sys_hi
 220 PRINT" System variables off
set from &";~start%
```

The program is based on the fact that – whether reading or writing – after such an osbyte call *X* contains the value of the location under scrutiny and *Y* contains the value of the location next higher in memory. So the one call reads both low and high bytes.

Remember, to find the actual memory address being affected you have to add the osbyte number to it. My OS1.2 returns &190 for the start address. This means the system variables should be stored at &236 (&190 + &A6) and above.

Recalling that osbyte &FE – 254 – determined the size of my ram, it means that on my micro the location involved is:

```
 &190+&FE
=&28E
```

Turn to Page 90 ▶

LOW BYTE – HIGH BYTE

The 6502 chip in our BBC Micro tends to handle information one byte at a time. A byte is simply a unit which can store a number in the range 0 to 255. Admittedly the reason for this odd range isn't immediately apparent. It's rooted in the binary and the related hexadecimal numbering systems. In hexadecimal the range of a byte would be described as &00 to &FF. One past this – 256 – would be represented by &100.

Unfortunately we can't fit &100 into one byte. We can represent it, though, if we decide to use two bytes for a number, a high byte and a low byte. Every time we got to 256 in the low byte we'd carry one to the high byte.

Given this scheme of things, &100 or &0100 would be represented by high byte &01 and low byte &00. &8023 – the address of Basic II's start up routine – would have high byte &80 and low byte &23. The highest number you can store in two bytes – and incidentally, the highest memory location a 6502 can address without resorting to tricks – is &FFFF, or 65535 in decimal.

The rule is, given a four digit hex number, the first two digits make up the high byte and the last two the low byte. If you think about it, a unit in the high byte is worth 256, so to find the value of a number the formula is:

```
256*high + low
```

If you want to go the other way and divide a number into its high and low components:

```
high=number DIV 256
low=number MOD 256
```

Remember you can use &100 instead of 256.

One final point: The 6502 likes its information in low byte, high byte form and in ram this pair of bytes appears in the reverse order to which it's normally written. For instance the 6502 wants to see &8023 as the hex bytes 23 80.

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◀ From Page 88

which I can soon confirm by using:

```
?&28E=&40
```

to give me a 16k Model B.

Of course, for compatibility's sake I shouldn't poke directly like this – I should use the official osbyte or *FX call. Fortunately they're well documented in the Advanced User Guide – in fact I prefer the old version to the new when it comes to listing the osbytes.

I can't pretend they're the easiest subject in the world to follow but play around with them. As you grow more confident you'll be amazed at the power the osbytes give you over your micro.

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- Supposing that the address of your machine code routine is in *code%* and you want to store the result in *result%*, call the routine with:

```
result%=USR(code%)
```

- Now, assuming you want the *A* register's value in *A%* and so on, you can derive the values from *result%* with:

```
A%=(result% AND &FF)
X%=(result% AND &FF00) DIV &100
Y%=(result% AND &FF0000) DIV &10000
C%=(result% AND &1000000) DIV &1000000
```

A quicker, but messier, method is to place the result into four bytes of ram and then peek the individual components:

```
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Y%=?&72
C%=?&73 AND 1
```


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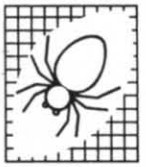

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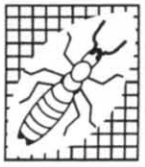

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Ring the changes with a tinkler

George Speller meditates with a device that produces fascinating sound

FEATURES in *The Micro User* are often technical or have a very serious application – even games require a lot of typing. But Tinkles is a very simple hardware project that, while demonstrating a genuine micro application, is really just for fun.

Simply by connecting a light sensitive resistor – an electronic component whose resistance alters depending on the amount of light falling on it – to the joystick port and feeding the changing levels to the sound output produces a delightful result. If you don't want to make the hardware you can still enjoy the noise if you run the program and move a joystick.

The wiring is as shown in the illustration: You should connect the outer shield of the lead to one of the inner wires and join this to pin 8 of the plug with the other end attached to one side of the light-sensitive resistor. The other inner wire connects the opposite side of the OPR to pin 15 of the plug – joystick channel 0 – and, through a 10K resistor, to pin 11 – the reference voltage.

The program is straightforward with two procedures for setting up and three more contained within a REPEAT loop.

In PROCinit the channel selector is set to zero and three similar envelopes are created. These vary the volume according to the rate of change of light – rather than just on the light level.

PROCtext provides a few directions and is deliberately obscure about the percussion effects – we don't want things too cut and dried.

The main program loop contains PROCtone which gets the current light intensity value from the analogue port and converts this to a range of values suitable for the sound generator.

The actual sound production in PROCsound involves some unusual programming because the variable *timex%* causes the sound generator to make silent sounds when there is no change in the light level. The length in time of no change is stored in *count%*.

The sound channel is selected by rotation and channel 0 is included if percussion is asked for. The level is determined by the rate of change of light levels and by *D%*.

The overall parameters are controlled in PROCtime where you can change the length of notes, select percussion mode, and the musical intervals to be used.

Type in the program, ensuring you have made no errors using Get it Right! Save it and you can test it with joystick by plugging it in and wiggling it about. Make up the lead and check if it's working by typing:

```
CLS:REPEATPRINTTAB(0,0)A
DVAL(1)DIV128:UNTILFALSE
```

By covering and uncovering the OPR you should see the on screen value changing according to the amount of light hitting the resistor.

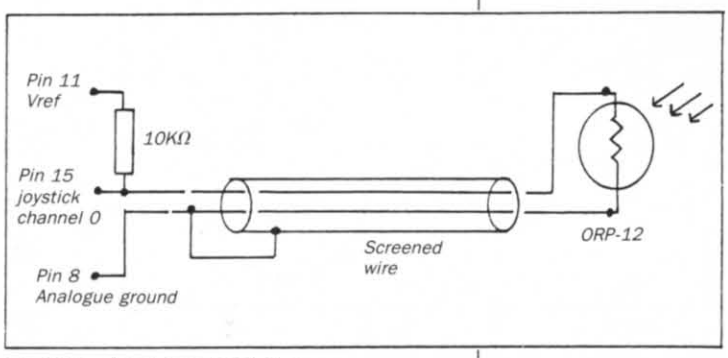
You can now run the main program and you'll hear your micro producing strange and haunting sounds. If you want, you can enhance the program by making it produce a visual display as well.

If the light-sensitive cell is on a flexible lead it may be hung out of the window to blow in the wind like Chinese bells or put under a tree where the moving shadows of leaves can fall on it. Long note lengths will produce slow changing sounds and intervals which are multiples of four are more harmonious than others, as these correspond to those which can be produced on a conventional instrument.

Percussion can be selected to be continuous or only on sudden movements. Many of the percussion operations actually produce low frequency notes which add interest.

So there you have it: A way of producing spellbinding sounds even if you can't play a musical instrument.

Turn to Page 94 ▶



The circuit diagram for the device

What you need:

- 10K resistor
- ORP-12 light sensitive resistor
- 1 metre shielded two core wire
- 15 pin D-type plug
- Wire strippers
- Soldering iron

Troubles?

If your lead does not work make sure all the soldering joints are clean and you have not shorted two or more pins accidentally

◀ From Page 93

```
  10 REM Tinkles
  20 REM by George Speller
  30 REM (c) The Micro User
  40 MODE7:PROCinit:PROCtext
  50 REPEAT Q%=P%:PROCtone
  60 PROCsound:PROCtime
  70 UNTIL FALSE:END
  80 DEF PROCtone:X%=ADVAL(1)
  90 P%=256-X%/127:ENDPROC
 100 DEF PROCsound
 110 timex%=time%:D%=ABS(P%-Q%)
 120 IF D%<time%*1.5 count%=count%+1:IF
 count%>time%*10 timex%=0
 130 channel%=channel%+1
 140 IF channel%>3 channel%=1+(B$="2")
 150 SOUND channel%,3-(D%>20)-(D%>30),P
%,timex%
 160 IF B$="1" AND D%>10 SOUND0,3,3-(D%
>20)-(D%>30),timex%
 170 ENDPROC
 180 DEF PROCinit:*FX4,1
 190 VDU23;11,0;0;0;0;:channel%=0
 200 ENVELOPE1,10,0,0,0,0,10,200,200,100,
-10,-10,-10,126,20
 210 ENVELOPE2,10,0,0,0,0,10,200,200,50,-
10,-10,-10,126,20
 220 ENVELOPE3,10,0,0,0,0,10,200,200,30,-
10,-10,-10,126,20
 230 time%=1:K%=1:B$="0":*FX15,3
 240 C$=CHR$4:timex%=0:ENDPROC
 250 DEF PROCtime
 260 A$=INKEY$0:IF A$="" ENDPROC
 270 time%=time%+(INKEY-42 AND time%>0)
-(INKEY-58 AND time%<100)
 280 K%=K%+(INKEY-26 AND K%>1)-(INKEY-1
22 AND K%<100)
 290 IF INSTR("012",A$)>0 B$=A$
 300 PRINTTAB(10,10)time%,K%
 310 PRINTTAB(19,12)B$:ENDPROC
 320 DEF PROCtext
 330 PRINT"CHR$136CHR$131"Tinkles"
 340 PRINTCHR$134"Change note length by
 pressing up or"
 350 PRINTCHR$134"down arrows."
 360 PRINTCHR$134"Change interval by pr
essing left or"
 370 PRINTCHR$134"right arrows"
 380 PRINTTAB(17,9)"Length","Interval"
 390 PRINTTAB(17,11)"Percussion"
 400 PRINTTAB(10,10)time%,K%
 410 PRINTTAB(0,19)CHR$131"Select percu
ssion"
 420 PRINTCHR$131"0 or space...none"
 430 PRINTCHR$131"1...for sudden change
s"
 440 PRINTCHR$131"2...constant"
 450 PRINTCHR$131CHR$136"I think....!"
```

Get it right!

10 = 0 0		
20 = 0 0		
30 = 0 0		
40 = 41D1 1		
50 = 47B9 E	190 = 4B28 E	330 = 5953 D
60 = 5507 5	200 = 607 D	340 = 93EC C
70 = DADE 6	210 = 71 D	350 = EAEF F
80 = 4844 B	220 = B68D E	360 = 866F 5
90 = 13C6 4	230 = 79AA A	370 = 8FD9 C
100 = 5D1C 4	240 = D568 E	380 = DDD9 8
110 = 33FF 0	250 = 29B2 1	390 = D30D 7
120 = 130D 0	260 = 9DF5 3	400 = 2A3B 8
130 = DA7A 5	270 = AFA9 9	410 = 4F87 3
140 = EC8C 5	280 = FF8D 0	420 = 2D0 4
150 = D9F 1	290 = D0C3 6	430 = 2E22 9
160 = DA52 E	300 = 2A3B B	440 = 234F 5
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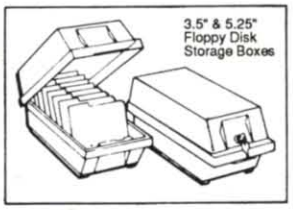

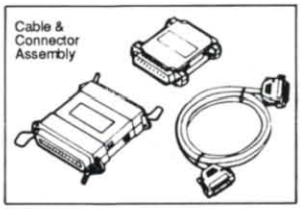

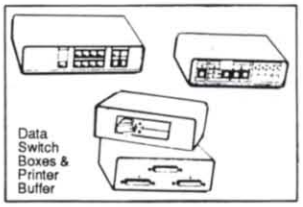

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Getting data from Junior

Paul Hendy gets to grips with the latest member of the Genie family

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Tel: 03552 32796

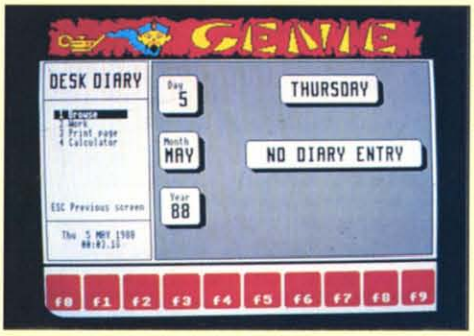
IN the review of Genie in the October 1987 issue of *The Micro User*, I said that it was the best utility for the BBC Micro I had ever seen. Now PMS has responded to those asking for a cheaper version. Clearly some compromises had to be made, so they made the difficult decision of making Genie disc-based.

I suspect this must have caused some heartache, because a major advantage of Genie is that the data is always instantly available – giving you an address book, notepad, desk diary, calendar and calculator.

Having said this, had PMS released Junior first everybody would have been raving about it anyway – without any thought for on-board storage.

The package consists of a control rom and a copy-protected disc which contains the main programs. While debatable in other situations, in this instance I think PMS was right to copy-protect the disc. The backup support from the company has proved extremely effective so the inconvenience of not being able to backup the programs is very slight. You can copy your own data as many times as needed.

After inserting the control rom and summoning Genie with Control+Shift+G – or *Genie – you are told to insert the disc and, after a brief access, the main menu is displayed. This contains all the options of the original Genie, selected by pressing the appropriate number or moving the highlight bar with the cursor keys and pressing Return. In all cases Escape takes you back to the previously selected menu.



Points for

- All Genie facilities
- Superb value

Against

- Not memory resident

Address Book

Choosing this option reveals a screen containing five panels of information for the surname, forenames, address, phone number and details. From here you can select Browse or Work – the latter to add new entries. Entry is very easy using the normal editing and cursor keys: The records are automatically indexed in alphabetical order.

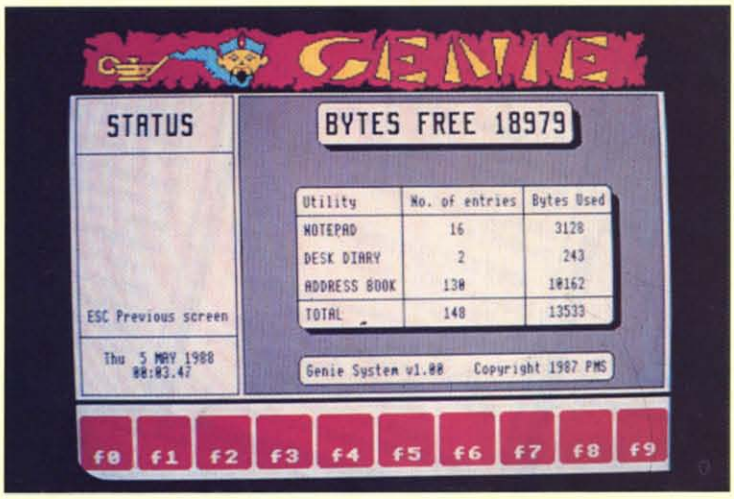
Browsing is done using the cursor keys, but there is also a Find option to locate any piece of information in the address book. Thus you may search for all those living in Leeds, even though this part of the address may occur on different lines in the six-line block address. Once the required record has been found you can select Print Label – a simple and effective means of transferring the information from Genie.

Calendar

This displays the month in the usual format and combinations of the cursor keys with Shift allow you to rapidly move from month to month and year to year. The calendar can be accessed from other options within Genie, and it comes into its own when used in conjunction with the Diary.

Calculator

The display is controlled by the numeric and function keys. A nice touch here is that the designers have anticipated likely key presses: Return is the same as =. Perhaps not so obvious until you make the mistake, the minus key is also duplicated by the underline key. It is the small details of Junior and its larger brother that distinguish it from other products which expect you to conform

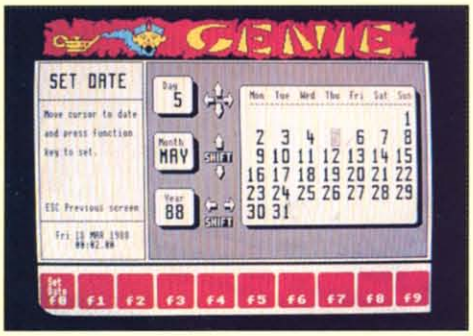


to their idiosyncracies, rather than trying to accommodate yours.

Desk Diary

For me this is the best part of Genie – especially if linked with the PMS real-time clock to save you having to set the time and date each time you enter Genie. It operates in a similar way to the address book, so you can browse or work.

Once an entry has been made in the diary, the



calendar block for that day will be shaded to indicate it. Pressing Return while any day is highlighted will take you to the diary entry for that day – a combination that is a delight to use.

Notepad

This section provides a free-form page for storage of notes, letters, jottings and so on. Any page can be printed out and, like the address book, any string of characters can be located using Find.

Phonebook

This option simply displays the names and phone numbers of all entries from the address book in alphabetical order.

Options

Selecting this reveals a further menu to set up the date – and date stamp for each notepad page if required – as well as colours and password.

Genie Junior can be protected from unauthorised access by a password – but don't forget it. I did during the review and had to use the facility provided by PMS for decoding the password. The screen displays a very long string of numbers and giving this information to PMS allows them to decipher the codeword which will then allow you access back into the system.

The manual gives clear instructions on backing up files as well as details of the various associated star commands including disabling the Genie keyboard intercept – sometimes necessary for certain pieces of software, particularly games. There is also a disc utility program for tidying up the data files to enable them to be accessed as efficiently as possible.

It did not take long to convince me that there was a large potential market for this product. For those unable to afford the instant rom version, this provides all the options and represents excellent value for money.

The bottom line...

Excellent for those who can't afford the instant version – it's the small details that distinguish it.

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Here's looking at Euclid

Steve Turnbull moves into the third dimension

Product: Euclid
Price: £45
Supplier: Ace Computing, 27 Victoria Road, Cambridge CB4 3BW
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DESIGN work in 3D is something which took a long time to develop on the 8 bit BBC Micro, but with the advent of the Archimedes new vistas have opened up and already the first solid modelling package has arrived in the form of Euclid.

There are several demos on the disc presenting various 3D scenes allowing you to rotate or move the objects very rapidly. None of them is particularly spectacular, but they do give an idea of the effects the package is capable of producing.

There's a spaceship flying over a landscape – like Zarch, but you can choose to have the pilot's viewpoint – and several examples of moving and rotating shapes using the mouse and keyboard.

The most fascinating, however, is a simple surface looking like a patchwork quilt. By using the mouse you can alter the parameters of the formula which defines this plane and distort it or flatten it out with amazing speed – it's both entertaining and educational.

The main 3D design software consists of a front-end Basic program backing on to a 3D display module – Euclid itself. When it's booted up you are presented with several large icons along the bottom – disc, ace symbol and a window icon. Plus four main display windows named Above, Left, Front and View.

The user-friendliness of any software product can be determined by how far you can get without resorting to the manual – and this Wimp-based package is not exactly *intuitive* in use. Clicking the disc icon brings up lots of options including Load and Append: Unfortunately, although you can click any of the filenames presented, nothing appears in any of the display windows – so you have to read the manual.

The documentation of the review copy was in its second draft form and fairly clear, leading through steps to display one of the example pictures. The names of all available files are displayed as standard Wimp menus which makes selection from the default directory simple. But to access a different directory requires selection from another menu and then return to the load/append options – the whole system is very unwieldy and requires lots of key clicks because menus disappear when an item is chosen.

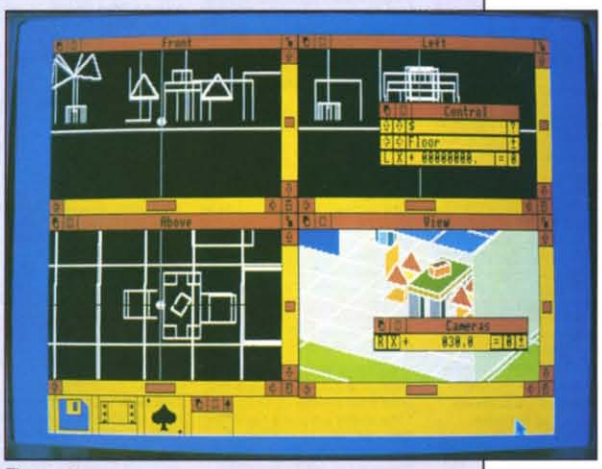
Building images is not too difficult, though again fiddly. I'm sure it could be simplified, perhaps by more graphical representation of rotational data. Designing a 3D object is a matter of specifying its general type and then manipulating the corners and vanes – the Euclid name for a surface – to push it into the shape you want. Colours can be set for either the current vane or the whole object.

The data for the whole scene is held in a hierarchical structure starting with the overall picture, which will be composed of a set of objects, each of which can have any number of sub-objects and sub-sub-objects. Ultimately you reach the vanes and corners of the individual parts.

One advantage of the hierarchy system is that if

Turn to Page 100 ▶

The patchwork quilt demo

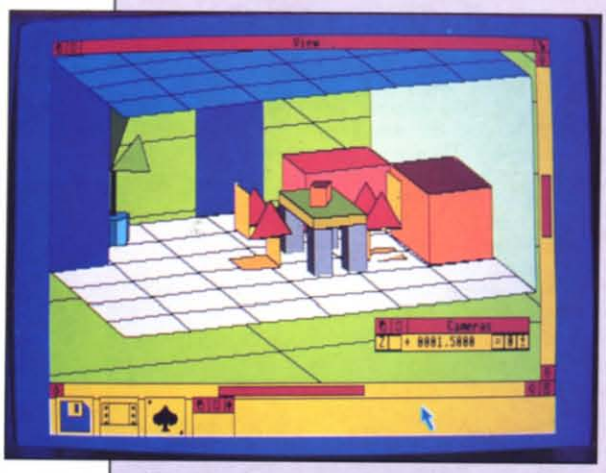


The main screen

◀ *From Page 99*

an object appears more than once in the scene you need only define it once – you can copy it as many times as you need. If you then alter the basic definition every duplicate will show identical changes.

As you modify parts of the scene you can see what's happening in the various windows – there are 16 of them. Six contain the standard left/right, front/back and above/below aspects with fixed viewpoints – these are usually displayed as wire-frame images to make aligning objects easier.



The View window

There are 10 camera windows that always display the overall scene. Nine – #1 to #9 – allow you to move the viewpoint – roll and zoom but not pan – via a special window. Camera#0 is the special View camera which displays at the level of hierarchy currently being edited.

Printouts can either be of the whole screen or just the View window and several printer drivers are provided, both mono and colour. You can also do a screen save for loading into other packages. One problem is that you can't dump a large and complex screen without displaying and re-displaying different sections of it.

Euclid seems pretty robust, but I did manage to crash the Design program at one point – although I couldn't reproduce the fault. Fortunately there is a save option when a crash occurs so you should be able to recover from it.

However, the true power of the package is not the 3D designer: It lies in the Euclid relocatable module. This software is accessible from Basic via its own set of SYS commands which means you can design images then create Basic programs to manipulate and display them. This is the way all the demo programs were written and makes Euclid very useful indeed.

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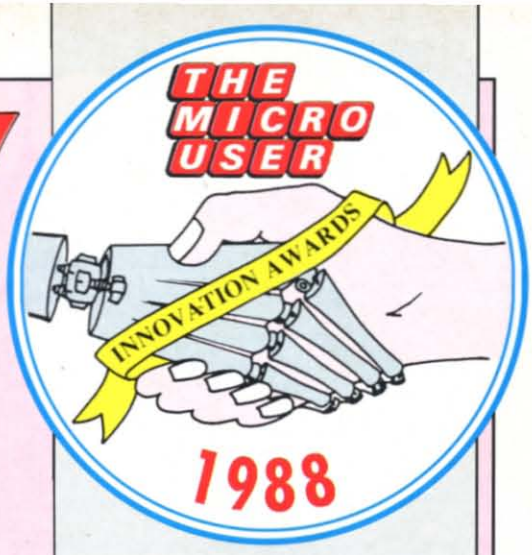

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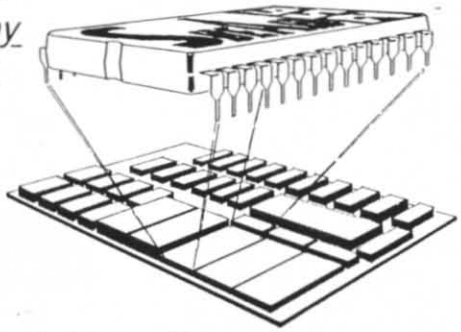
John Allen finds an easier way round his hardware problems



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SOONER or later most BBC B owners run out of rom sockets or ram. The solution is to get one or more add-on boards to acquire some of the facilities standard in the Master. One such is Solidisk's Twomeg 128 board which provides four additional rom sockets and an extra 128k of ram to be used in different combinations as sideways ram, shadow memory, ram disc or printer buffer.

Unfortunately the software supplied with it is not very user-friendly and that's where SideAid128 comes in. It's a manager rom which makes the ram board easier to use and has commands which are more like those on the Master.

The Twomeg board has eight banks of sideways ram numbered from 4 to 7 and 12 to 15. Each is 16k and can hold an image of a rom. The original rom sockets become roms 0 to 3 and the additional ones on the board are 8 to 11.

Shadow memory

So what can SideAid128 do with a Twomeg 128 board? The area of memory normally used to store the screen display can be taken out of user ram and on to the Twomeg board, leaving more space for programs, word processor text and so on.

There are two different ways of doing this: *SHADOW, which assumes that you always want shadow memory, and *PLUS, which follows the same conventions as the B+ and Master, with Modes 0 to 7 in main memory and 128 to 135 in shadow. Shadow memory uses banks 12 and 13 of sideways ram.

If you have a Solidisk DFS or ADFS you can use banks 4 to 7 for a 64k ram disc. Unlike the Solidisk manager, SideAid128 will recover the ram disc even after a Control+Break.

The standard BBC Micro only has a 64 byte buffer for the printer so outputting long documents ties up the machine completely. SideAid128 creates a 24k printer buffer by using banks 14 and 15 so you can do something else while the printer grinds on. Unlike some other systems you don't need to restart printing after every disc access, but if you press Break you have to revert to Basic and execute VDU2,3 to continue. A star command would be nice.

Sideways ram

To me the real value of SideAid128 lies in its sensible commands for loading and saving sideways ram. As supplied, the Twomeg 128 board has a Basic program for this which I find inconvenient in use. For example if you are word processing and want to load a Spell-Master user dictionary you have to save the text, go into Basic, run the loading program – which can only load images from drive 0 – return to your editor and load the text.

SideAid128 has *RLOAD and *RSAVE to make loading and saving roms images far simpler. They're fast – even quicker than the Master – don't corrupt memory, and provided the image you're loading doesn't claim workspace it's also initialised.

In addition, there are all sorts of other commands for manipulating memory, turning roms on and off, fast backup for DFS discs and equivalents for the Master's *SR commands.

There is a warning in the manual that it is written with the Solidisk DFS and ADFS in mind, but except for the ram disc, it can be used with others. I did however find problems with *RINFO and the Acorn 0.90 DFS, so there may be others.

I discovered two undocumented quirks: After pressing Break the whole display moves down by one line but reverts to its original position after Control+Break. And the screen interlace is automatically turned off in Modes 0 to 6 – which for many is a bonus.

The bottom line...

This rom makes the board easier to use and performs in a logical manner. The combination provides remarkable facilities at reasonable cost.

Main SideAid128 commands

***FBACKUP**	Fast DFS disc backup
***KEEP**	Turn off all roms except itself, DFS, ADFS and current language
***MHUNT**	Search memory
***MZAP**	Edit memory
***PLUS**	Shadow on/off
***PRINTER**	Printer buffer on/off
***RAMDISK**	Ram disc on
***RAMOFF**	Ram disc off
***RAMOLD**	Recover ram disc after Break or *RAMOFF
***RINFO**	Display information on roms present
***RLOAD**	Load a rom image into sideways ram
***ROFF**	Turn rom off
***RON**	Turn rom on
***ROMS**	Display status of roms and sideways ram in the machine
***RSAVE**	Save rom image to disc
***RTEST**	Test sideways ram
***SEND**	Send a star command to a specific rom
***SHADOW**	Shadow on/off

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Software is currently transmitted for a period of one week. The teachers' notes for the TV series Issues *are transmitted from Wednesday to the following Tuesday and all other files are updated on Fridays. There will be periods during the update day when the files are unavailable. The program details given are provisional.*

August 5 to 11

Due to re-scheduling of transmissions the details for this week are the same as the ones published for July 29 to August 4 in the August issue of The Micro User.

August 12 to 18

T/SWR06
OSBYTE, Trace
The series aimed at helping programmers understand sideways ram continues with an explanation of the operating system's osbyte calls, and demonstrates how to add a new osbyte (*FX) routine to convert Ascii numbers into binary notation.

DatPtch
The ATS rom's *DATE routine has a minor error and is currently giving a result that is one day out. This problem will correct itself in a few months but, in the meantime, DatPtch will cause the *DATE and its associated osword call to produce the true date when called.

CatMast, MastCat
Do you have difficulty in finding a particular program you know is saved somewhere but are not sure on which disc? Save the tedious task of cataloguing every disc you have – use CatMast. The routine will store the file titles on all your discs, making finding any particular program a very simple task.

Inlay, InlyTxt
Produce your own personal cassette inlays for all your music tapes. Enter details of the recorded music track by track, add a main title, then Inlay will print out a neat and tidy card to fit inside the cassette case. The program requires an Epson compatible printer.

T/DFS01
Cycles, HowMany, Status, Output
More from our series explaining the intricacies of the Acorn disc filing system. T/DFS01 looks at the DFS osword commands, explaining what each available command does and showing how they may be used within your own assembler language routines.

Barny Bee
A delightful game that's fun for everyone. It was first published in the January issue of *The Micro User*.

August 19 to 25

T/SWR07
Trace, Osword
Part seven of our SWR series looks at how to construct new osword calls that can read a list of parameters and demonstrates the procedure with a new osword call that performs the equivalent of a PRINT(r routine.

Editor
Example, Trap, E/Info, ProgInf
Font designer software, allowing you to design your own printer font characters for use as a normal character set when printing. You can also use Editor to edit the user defined graphics characters of the BBC Micro.

TVDiary
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T/DFS02
Form10, NotForm, Write10
Read10
A further look at the DFS's osword calls. T/DFS02 explains, amongst other things, the principles of disc formatting, and shows how to detect a non-formatted disc without crashing the program.

Darts
Have you the skill to keep a steady hand and be right on target in this superb simulation from the April issue of *The Micro User?*

August 26 to Sept 1

Ships
Rules, Scores
Play the traditional game of Battleships on your micro.

T/SWR08
Error
This module of the sideways ram series shows how to check for out-of-range parameters in a statement supplied by the user – a principle demonstrated by the program Error.

OilRig, OilRig2
An intriguing game involving the siting and operation of North Sea oil rigs. As leader of the well exploration team, can you find the most lucrative site for your company's rig constructions? Use your judgement to find the best time to sell it to another company, or fight off the offers made by your rivals. This game is very entertaining, and is sufficiently realistic to be of value in educational situations.

T/DFS03
Offset, IDSDump, Verify
The investigation of the Acorn DFS continues with an in-depth study of the formatting of single density discs, and shows how, by adjusting the disc format routine, the time taken to access the disc can be dramatically reduced.

Recover
An easy to use routine to let you salvage *lost* files from your disc. It was first published in the February issue of *The Micro User*.

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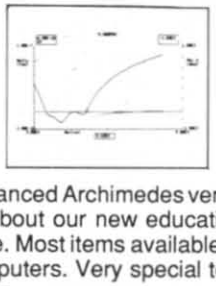

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Listing I: The editor

```
  10 REM Bertha data editor
  20 REM By Mark de Weger
  30 REM (c) The Micro User
  40 MODE7:ON ERROR REPORT:PRINT " at l
ine ";ERL:END
  50 mxstr=8:REM Num of start lines+1
  60 mxend=5:REM Num of end lines+1
  70 mxwds=25:REM Num of keywds+1
  80 mxrsp=7:REM Num of responses assoc
iated with 1 keywds+1
  90 DIM s$(mxstr),e$(mxend),b%100
 100 DIM w$(mxwds),r$(mxwds,mxrsp)
 110 f$="":n$=""
 120 ON ERROR CLOSE#0:VDU3:IF ERR<>17 C
LS:REPORT:PRINT" at line ";ERL:END
 130 REPEAT CLS:V%=FNmenu
 140 IF (V%<3 OR V%>6) IF NOT FNyes(" A
re you sure? ") UNTIL FALSE
 150 CLS:PRINT
 160 IF V%=1 PROCcat:PROCload
 170 IF V%=2 PROCcat:PROCsave
 180 IF V%=3 PROCname
 190 IF V%=4 PROCstart
 200 IF V%=5 PROCend
 210 IF V%=6 PROCmatch
 220 IF V%=7 PROCprint
 230 UNTIL V%=8:END
 240 DEF FNmenu
 250 PROChd("Bertha data editor")
 260 PRINT'CHR$133"By Mark de Weger"
 270 PRINT"1. Load file"
 280 PRINT"2. Save file"
 290 PRINT"3. Edit character's name"
 300 PRINT"4. Edit start lines"
 310 PRINT"5. Edit end lines"
 320 PRINT"6. Edit matches/responses"
 330 PRINT"7. Output to printer"
 340 PRINT"8. Quit":=FNg(1,8)
 350 DEF PROCcat:LOCAL A%,Y%,Z%
 360 REPEAT CLS:Z%=USR(&FFDA)AND&FF
 370 IF Z%=4 OR Z%=5 OR Z%=8 THEN *CAT
 380 IF f$<>"" PRINT"Current filename:
 "f$ ELSE PRINT
 390 INPUT"Enter filename (or *): "f$
 400 IF LEFT$(f$,1)="*" PROCos(f$):PRIN
T"Press a key":REPEATUNTILGET
 410 UNTIL LEFT$(f$,1)<>"*":ENDPROC
 420 DEF PROCos($b%):LOCALX%,Y%
 430 X%=b%:Y%=b%DIV256:CALL&FFF7
 440 ENDPROC
 450 DEF PROCload:H%=OPENIN(f$)
 460 IF H%=0 CLOSE#0:PRINT"File not fo
und""Press a key":REPEATUNTILGET:ENDPRO
C
 470 FOR L%=1TOmxstr:s$(L%)="":NEXT
 480 FOR L%=1TOmxend:e$(L%)="":NEXT
 490 FOR M%=1TOmxwds:w$(M%)=""
 500 FOR N%=1 TO mxrsp:r$(M%,N%)=""
 510 NEXT:NEXT:n$=FNin
 520 PRINT"Character: "n$:d$=FNin
 530 S%=0:REPEAT S%=S%+1:s$(S%)=FNin
 540 UNTIL s$(S%)=""
 550 E%=0:REPEAT E%=E%+1:e$(E%)=FNin
 560 UNTIL e$(E%)=""
 570 W%=0:REPEAT W%=W%+1:w$(W%)=FNin
 580 IF w$(W%)="@" THEN 620
 590 C%=0:REPEAT C%=C%+1:t$=FNin
 600 r$(W%,C%)=t$:UNTIL t$=""
 610 IF r$(W%,C%)<>"" d$=FNin
 620 UNTIL w$(W%)="@" OR d$="@"
```

```
 630 IF w$(W%)="@" w$(W%)=""
 640 CLOSE#H%:ENDPROC
 650 DEF PROChd(t$):CLS:PRINT
 660 FOR L%=1 TO 2:VDU131,157,132,141
 670 PRINTTAB((37-LENt$)/2)t$:NEXT
 680 ENDPROC
 690 DEF PROCsave:H%=OPENOUT(f$)
 700 PROCof(TRUE):CLOSE#H%:ENDPROC
 710 DEF PROCprint:CLS:VDU2
 720 PROCof(FALSE):VDU3:ENDPROC
 730 DEF PROCof(sv):PROCo(n$):PROCo("")
 740 S%=0:REPEAT S%=S%+1
 750 IF s$(S%)<>"" PROCo(s$(S%))
 760 UNTIL S%=mxstr:PROCo("")
 770 E%=0:REPEAT E%=E%+1
 780 IF e$(E%)<>"" PROCo(e$(E%))
 790 UNTIL E%=mxend:PROCo("")
 800 W%=0:REPEAT W%=W%+1
 810 IF w$(W%)="" THEN 850
 820 PROCo(w$(W%)):C%=0:REPEAT C%=C%+1
 830 IF r$(W%,C%)<>"" PROCo(r$(W%,C%))
 840 UNTIL C%=mxrsp:PROCo("")
 850 UNTIL W%=mxwds:PROCo("@"):ENDPROC
 860 DEF PROCname
 870 PRINT"Current name: "n$
 880 INPUTLINE"Enter new name: "n$
 890 ENDPROC
 900 DEF PROCstart:REPEATFORS%=1TOmxstr
 910 PRINTSPC2;S%". "FNc(s$(S%)):NEXT
 920 G%=FNg(0,mxstr)
 930 IF G%=0 UNTILTRUE:ENDPROC ELSE CLS
 940 PRINT"Current start line: ";
 950 PRINTFNc(s$(G%))
 960 INPUTLINE"Enter new start line: "
s$(G%):CLS:UNTILFALSE:ENDPROC
 970 DEF PROCend:REPEAT FORE%=1TOmxend
 980 PRINTSPC2;E%". "FNc(e$(E%)):NEXT
 990 G%=FNg(0,mxend)
1000 IF G%=0 UNTILTRUE:ENDPROC ELSE CLS
1010 PRINT"Current end line: ";
1020 PRINTFNc(e$(G%))
1030 INPUTLINE"Enter new end line: "e$
(G%):CLS:UNTILFALSE:ENDPROC
1040 DEF PROCmatch
1050 REPEAT FORC%=1TOmxwds:IFC%<10VDU32
1060 PRINT" ";C%". "FNc(w$(C%))
1070 IF C%MOD20=0 PRINT"Press space":R
EPEAT UNTIL GET=32:CLS:PRINT
1080 NEXT:W%=FNg(0,mxwds)
1090 IF W%=0 UNTILTRUE:ENDPROC ELSE REP
EAT CLS
1100 PRINT"Match:"" 1. "FNc(w$(W%))
1110 PRINT"Responses:"
1120 FOR C%=1 TO mxrsp
1130 PRINTSPC2;C%+1". "FNc(r$(W%,C%))
1140 NEXT:G%=FNg(0,mxrsp):CLS
1150 IF G%=0 UNTILTRUE:UNTILFALSE
1160 PRINT"Old match/response: ";
1170 IF G%=1 t$=w$(W%) ELSE t$=r$(W%,G%
-1)
1180 PRINTFNc(t$)
1190 INPUTLINE"Enter new match/response
: "t$
1200 IF G%=1 w$(W%)=t$ ELSE r$(W%,G%-1)
=t$
1210 CLS:UNTILFALSE:ENDPROC
1220 DEF FNyes(t$):PRINT't$;:*FX15
1230 LOCALI%:REPEAT t$=CHR$(GETAND&5F)
1240 VDUASCt$8:I%=INSTR("YyNn",t$)
1250 UNTIL I%>0:=I%<3
1260 DEF FNin:INPUT#H%,t$:=t$
1270 DEF FNg(min,max):*FX15
1280 IF min=0 PRINT"Enter option (Retu
rn not to change): "; ELSE PRINT" Enter
 option: ";
1290 REPEAT INPUT"G%
1300 UNTIL min<=G% AND max>=G%:=G%
1310 DEF PROCo(t$)
1320 IF sv PRINT#H%,t$ ELSE PRINTt$
1330 ENDPROC
1340 DEF FNc(t$)
1350 IF t$="" ="Empty" ELSE =t$
```

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Get it right!

LINE	CHSUM	LINE	CHSUM	LINE	CHSUM
10 =	0 0	460 =	3D94 E	910 =	7A5 C
20 =	0 0	470 =	B84C 7	920 =	A33F A
30 =	0 0	480 =	C6E5 C	930 =	52B9 0
40 =	1188 8	490 =	797D F	940 =	1044 1
50 =	E020 3	500 =	4F2E 1	950 =	14CF 1
60 =	7FD3 5	510 =	A6FC F	960 =	8BBA 0
70 =	ECDB D	520 =	ED45 6	970 =	65B 6
80 =	3F02 C	530 =	C586 E	980 =	6BAD 5
90 =	F2FE C	540 =	9D8A 0	990 =	B276 7
100 =	4676 3	550 =	4856 4	1000 =	52B9 7
110 =	BA9C 8	560 =	399 D	1010 =	B816 9
120 =	5C63 6	570 =	C491 1	1020 =	8291 2
130 =	E0E7 7	580 =	CA8 0	1030 =	DA4A B
140 =	4AB4 0	590 =	3E3 5	1040 =	B454 7
150 =	8005 1	600 =	91B3 3	1050 =	6C 1
160 =	71AA F	610 =	4BD6 6	1060 =	A842 4
170 =	2AB8 8	620 =	DE2D 6	1070 =	1B5F F
180 =	37BF 6	630 =	8B4C 5	1080 =	9D57 3
190 =	6DF8 F	640 =	8B08 3	1090 =	F192 F
200 =	C3CB 2	650 =	5CDE 9	1100 =	DCCE B
210 =	C522 D	660 =	52B6 A	1110 =	42B0 0
220 =	8379 D	670 =	C352 A	1120 =	C5B3 1
230 =	CD92 9	680 =	ED0F A	1130 =	6232 1
240 =	2BD6 B	690 =	8BDF 1	1140 =	4CB4 8
250 =	5246 F	700 =	18B2 1	1150 =	8767 8
260 =	E27C 1	710 =	2FD 8	1160 =	C819 3
270 =	75BD A	720 =	A9B5 8	1170 =	306C 9
280 =	E61C 3	730 =	35F9 0	1180 =	4E52 2
290 =	4588 F	740 =	8953 4	1190 =	96E3 B
300 =	D267 9	750 =	520A 5	1200 =	A131 A
310 =	9CF0 8	760 =	4E5F A	1210 =	6800 B
320 =	A2D4 8	770 =	EEA3 A	1220 =	7E58 3
330 =	22CE 8	780 =	58CA E	1230 =	5BBE 1
340 =	64D6 1	790 =	308E B	1240 =	3DDB 6
350 =	CDDF 3	800 =	7FC1 9	1250 =	A5D9 A
360 =	3B6B 6	810 =	DE2E 9	1260 =	52F0 A
370 =	A0D6 9	820 =	70FF F	1270 =	2D80 D
380 =	447 8	830 =	1D5D 9	1280 =	E918 5
390 =	6F16 5	840 =	519D 2	1290 =	880A 3
400 =	5597 3	850 =	5E78 6	1300 =	94BC A
410 =	350D 2	860 =	F31F 7	1310 =	A182 C
420 =	86D8 E	870 =	F8B3 A	1320 =	CBDB 7
430 =	255E 6	880 =	4E51 E	1330 =	ED0F E
440 =	ED0F 3	890 =	ED0F 0	1340 =	D7DC 3
450 =	57DE 0	900 =	F87F C	1350 =	F4C3 6

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Listing II: Main program

```
   10 REM Bertha
   20 REM By Mark de Weger
   30 REM (c) The Micro User
   40 ON ERROR CLOSE#0:VDU3:PRINT:REPORT
:PRINT" at ";ERL:END
   50 mxchrs=4:mxstr=8:mxend=5
   60 mxwds=25:mxrsp=7
   70 mxdi=100:mxfnd=10
   80 DIM f$(mxchrs),n$(mxchrs),str$(mxs
tr,mxchrs),end$(mxend,mxchrs)
   90 DIM wd$(mxwds,mxchrs),r$(mxwds,mxr
sp,mxchrs),lo%256
  100 DIM di$(mxdi),di%(mxdi),s%(mxstr),
w%(mxwds),e%(mxend),f%(mxfnd)
  110 zz$=STRING$(140," "):r$=zz$:d$=r$:
u$=r$:ln$=r$:a$=r$:b$=r$:wd$=r$:desc$=r$
:t$=r$
  120 r$="":d$="":u$="":ln$="":a$="":b$=
"":wd$="":desc$="":t$=""
  130 MODE135:PROChd:Z%=RND(-TIME)
  140 INPUT"Please enter your name: "u$
  150 INPUT"Screen mode (40/80): "mdcol
  160 IF mdcol=40 md=135 ELSE md=131
  170 MODE md:REPEAT MODE135:PROChd
  180 IF FNyes("Load new characters? ")
PROCld_fs
  190 MODE md:PROCdialogue:PRINT"
  200 IF FNyes("Print dialogue? ") PROCp
rint
  210 UNTIL FALSE:END
  220 DEF PROCld_fs:REPEAT
  230 INPUT"How many characters? "mc"
  240 IF mc>mxchrs PRINT"Max. ";mxchrs"
characters"
  250 UNTIL mc<=mxchrs:FOR L%=1 TO mc
  260 PRINT"Input filename ";L%" (Return
not to"" load): ";
  270 INPUT"f$(L%):NEXT
  280 FOR L%=1 TO mc
  290 IF f$(L%)>"" PROCld(L%)
  300 NEXT:ENDPROC
  310 DEF PROCld(N%):LOCAL L%
  320 PRINT"Loading file ";N%" Name: "
f$(N%)
  330 H%=OPENIN(f$(N%))
  340 IF H%=0 CLOSE#0:PRINT"File not fn
d":END
  350 FORL%=1TOmxstr:str$(L%,N%)="":NEXT
  360 FORL%=1TOmxend:end$(L%,N%)="":NEXT
  370 FORL%=1TOmxwds:wd$(L%,N%)=""
  380 FORM%=1TOmxrsp:r$(L%,M%,N%)=""
  390 NEXT:NEXT:n$(N%)=FNin
  400 PRINT"Character: "n$(N%):d$=FNin
  410 s%(N%)=0:REPEAT s%(N%)=s%(N%)+1
  420 str$(s%(N%),N%)=FNin
  430 UNTIL str$(s%(N%),N%)=""
  440 s%(N%)=s%(N%)-1:e%(N%)=0
  450 REPEAT e%(N%)=e%(N%)+1
  460 end$(e%(N%),N%)=FNin
  470 UNTIL end$(e%(N%),N%)=""
  480 e%(N%)=e%(N%)-1:w%(N%)=0
  490 REPEAT w%(N%)=w%(N%)+1
  500 wd$(w%(N%),N%)=FNin
  510 IF wd$(w%(N%),N%)="@" THEN 560
  520 C%=0:REPEAT C%=C%+1
  530 r$(w%(N%),C%,N%)=FNin
  540 UNTIL r$(w%(N%),C%,N%)=""
  550 IF r$(w%(N%),C%,N%)<>"" d$=FNin
  560 UNTIL wd$(w%(N%),N%)="@" OR d$="@"
  570 w%(N%)=w%(N%)-1:CLOSE#H%:ENDPROC
  580 DEF PROCdialogue
  590 mxlen=0:CLS:PRINT
  600 PROCop(99,"How many characters sho
uld take place in the dialogue?",mdcol)
  610 INPUT"mc
  620 self=FNyes("Will you take part you
rself? ")
  630 IF mc-self>2 rr=FNyes("Random resp
onse? ") ELSE rr=FALSE
  640 INPUT"Length of dialogue? "mlns
  650 mlns=mlns-1
  660 IF self mxlen=LENu$
  670 FOR L%=1 TO mc
  680 IF LENn$(L%)>mxlen mxlen=LENn$(L%)
  690 NEXT:mxlen=mxlen+2
  700 dc=0:lns=0:ss=FALSE:VDU14
  710 rrc=0:REPEAT rrc=(rrc MOD mc)+1
  720 IF rr L%=FNoptchar ELSE L%=rrc
  730 dc=dc+1
  740 IF rrc=1 IF lns=0 r$=FNstr:rsp=0:G
OTO 770
  750 keyw=FNgetkeyw
  760 IF keyw<>0 r$=FNrspons:rsp=-1 ELSE
r$=FNstr:rsp=0
  770 IF dc>mc IF di$(dc-mc+self)=r$ IF
rsp=0 IF s%(L%)>1 r$=di$(dc-1):GOTO 750
  780 IF dc>mc IF di$(dc-mc+self)=r$ IF
rsp IF (r$(keyw,2,L%)<>"" OR fnd>1) r$=d
i$(dc-1):GOTO 750
  790 di$(dc)=r$:di%(dc)=L%
  800 PROCop(L%,r$,mdcol)
  810 IF self AND ((rrc=mc AND NOT rr) O
R (rr AND (RND(mc)=1) AND NOT ss)) ss=TR
UE:dc=dc+1:r$=FNu:di$(dc)=r$:di%(dc)=100
ELSE ss=FALSE
  820 IF rrc=mc lns=lns+1
  830 UNTIL lns>=mlns
  840 FOR L%=1 TO mc:dc=dc+1
  850 di$(dc)=FNend:di%(dc)=L%
  860 PROCop(L%,di$(dc),mdcol):NEXT
  870 IF self dc=dc+1:di$(dc)=FNu:di%(dc
)=100
  880 VDU15:ENDPROC
  890 DEF PROCprint:CLS
  900 INPUTLINE"Enter description: "des
c$
  910 VDU2:PRINT"
  920 PROCop(99,desc$,80):PRINT"
  930 FOR L%=1 TO dc
  940 PROCop(di%(L%),di$(L%),80)
  950 NEXT:PRINT":VDU3:ENDPROC
  960 DEF FNstr=str$(FNrnd(s%(L%)),L%)
  970 DEF FNgetkeyw:fnd=0:r$=FNlo(r$)
  980 FOR wL%=1 TO w%(L%)
  990 IF FNinstr(r$,FNlo(wd$(wL%,L%))) f
nd=fnd+1:f%(fnd)=wL%
 1000 NEXT
 1010 IF fnd=0 =0 ELSE =f%(FNrnd(fnd))
 1020 DEF FNrspons:REPEAT
 1030 d$=r$(keyw,FNrnd(mxrsp),L%)
 1040 UNTIL d$<>":=d$
 1050 DEF FNoptchar:d%=L%
 1060 REPEAT L%=RND(mc)
 1070 UNTIL d%<>L% AND NOT(rrc=mc AND (l
ns+1)>=mlns AND L%=1 AND mc>2):=L%
 1080 DEF FNend=end$(FNrnd(e%(L%)),L%)
 1090 DEF FNu:PRINT"u$":TAB(mxlen);
 1100 INPUTLINE"d$:VDU11:=FNlo(d$)
 1110 DEF FNlo($lo%):LOCALB%,J%
 1120 FOR J%=0 TO LEN$lo%-1:B%=lo%?J%
 1130 IF B%>96 IF B%<123 ELSEIF B%>64 IF
B%<91 B%=B%OR32 ELSEB%=32
 1140 lo%?J%=B%:NEXT:=$lo%
 1150 DEF PROCop(N%,ln$,col)
 1160 IF N%=100 PRINT"u$; ELSE IF N%<>99
PRINT"n$(N%);
 1170 ac=ASCln$
 1180 IF ac>96 IF ac<123 ac=ac AND &DF
 1190 IF N%<>99 PRINT":TAB(mxlen);:vps=
mxlen+1:ps=2:VDUac ELSE sdum=mxlen:mxlen
=0:vps=mxlen:ps=1
 1200 IF ASCMID$(ln$,ps)=32VDU32:ps=ps+1
 1210 REPEAT wd$=FNwd:vps=vps+LENwd$+1
 1220 IF vps>(col-1) PRINT"TAB(mxlen);:v
ps=mxlen+LENwd$+1
 1230 PRINTwd$;:IF vps<(col-2) VDU32
 1240 UNTIL ps>=LENln$
 1250 IF N%=99 mxlen=sdum
 1260 ENDPROC
 1270 DEF FNwd:IF ASCMID$(ln$,ps)=32 REP
EATps=ps+1:UNTIL ASCMID$(ln$,ps)<>32
 1280 stt=ps:REPEAT ps=ps+1
 1290 UNTIL ASCMID$(ln$,ps)=32 OR MID$(l
n$,ps,1)=""
 1300 =MID$(ln$,stt,ps-stt)
 1310 DEF PROChd:CLS:t$="Bertha"
 1320 FOR L%=1 TO 2:VDU131,157,132,141
 1330 PRINTTAB(16-LENt$/2)t$:NEXT
 1340 PRINT"CHR$133"The dialogue-composi
ng program"CHR$133"by Mark de Weger"
 1350 ENDPROC
 1360 DEF FNyes(a$):PRINT"a$;:*FX15
 1370 LOCAL I%:REPEAT a$=GET$:VDUASCa$8
 1380 I%=INSTR("YyNn",a$):UNTILI%:=I%<3
 1390 DEF FNinstr(a$,b$)
 1400 IF LENb$>LENa$ =FALSE ELSE =INSTR(
a$,b$)
 1410 DEF FNin:INPUT#H%,t$:=t$
 1420 DEF FNrnd(R%)
 1430 IF R%=1 =1 ELSE =RND(R%)
```

LINE	CHSUM
10 =	0 0
20 =	0 0
30 =	0 0
40 =	E1DE E
50 =	FDF 2
60 =	5189 4
70 =	DD2C 2
80 =	F16 B
90 =	53A0 F
100 =	C992 3
110 =	B4A3 2
120 =	958A F
130 =	586 D
140 =	8EC2 3
150 =	66F3 3
160 =	3EA6 2
170 =	7585 1
180 =	F7FD F
190 =	3986 D
200 =	A137 1
210 =	DADE 8
220 =	8DA0 5
230 =	A2AE 5
240 =	3BD1 8
250 =	2B6 D
260 =	E035 5
270 =	165C D
280 =	FD95 8
290 =	CCBA 2
300 =	E531 7
310 =	B996 1
320 =	A75D 8
330 =	EA81 9
340 =	16CE 4
350 =	77E8 A
360 =	5541 2
370 =	D984 8
380 =	8F90 8
390 =	9ADD D
400 =	445D 6
410 =	2FA2 1
420 =	9F34 6
430 =	CD47 C
440 =	DCB A
450 =	364 B
460 =	967 5
470 =	FDE7 E
480 =	31CD A
490 =	B225 6

Get it right!

LINE	CHSUM
500 =	FD3D 7
510 =	3D14 8
520 =	6378 A
530 =	3A5C E
540 =	F201 8
550 =	2284 E
560 =	DDD2 A
570 =	E77C 5
580 =	92E5 3
590 =	F022 C
600 =	77DF 1
610 =	2A12 5
620 =	9B8B 0
630 =	1AE2 A
640 =	DFC4 4
650 =	865E A
660 =	F8AA C
670 =	FD95 F
680 =	D385 B
690 =	3183 4
700 =	748A 3
710 =	2A5C 6
720 =	C1C2 2
730 =	63C6 A
740 =	3EC5 F
750 =	86BD 0
760 =	D20B 4
770 =	180F A
780 =	9506 7
790 =	FE9 2
800 =	392 1
810 =	8D9C 6
820 =	D4A 4
830 =	48FE 9
840 =	4AAA 6
850 =	A959 E
860 =	470A 4
870 =	32B8 E
880 =	2DAC C
890 =	7B41 F
900 =	B420 9
910 =	E965 2
920 =	F946 9
930 =	470D A
940 =	F159 F
950 =	3DC7 2

LINE	CHSUM
960 =	2934 1
970 =	A0AE 4
980 =	C900 0
990 =	67D2 2
1000 =	2C83 C
1010 =	DC8D 9
1020 =	7BAA 7
1030 =	83D3 6
1040 =	E2FC A
1050 =	E089 1
1060 =	8FA9 3
1070 =	9714 7
1080 =	D8CB C
1090 =	1230 2
1100 =	EBF4 1
1110 =	606D F
1120 =	BCE 4
1130 =	41E7 E
1140 =	95A8 3
1150 =	EB E
1160 =	DB76 7
1170 =	826C 6
1180 =	A3E9 D
1190 =	10F9 6
1200 =	97F1 D
1210 =	864C F
1220 =	D8 6
1230 =	FC50 4
1240 =	C1EE F
1250 =	49D1 0
1260 =	ED0F 4
1270 =	45D4 1
1280 =	E5B1 D
1290 =	72CF F
1300 =	B1D8 8
1310 =	8DB0 C
1320 =	52B6 F
1330 =	AB67 D
1340 =	6336 B
1350 =	ED0F D
1360 =	21AE 9
1370 =	A211 3
1380 =	2491 D
1390 =	C647 C
1400 =	28E2 A
1410 =	52F0 7
1420 =	C163 D
1430 =	DF74 F

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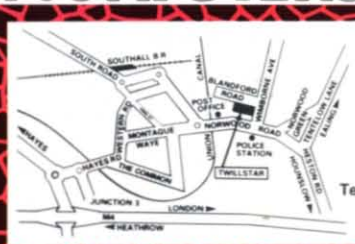

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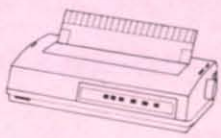

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Chinese Chess modifications

IT was delightful to see another game by Daniel Tang in the May 1988 issue of The Micro User. *His first – the two player Space Arena in the October 1987 issue – was a worthy listing, and anyone who has not yet typed it in is well advised to do so.*

The program Chinese Chess is completely different, but equally addictive. After typing it in I made the followig modifications which enhance the gameplay quite noticeably.

Add or change the lines shown below to Listing II – which began on page 147:

```
 1760PLOT85,764,448:GCOL0,
7:RESTORE1770:FORA%=1TO5:R
EADX%,Y%,R%:PROCcircle(X%,
Y%,R%):NEXT:GCOL0,6:FORA%=
6TO10:READX%,Y%,R%:PROCcir
cle(X%,Y%,R%):NEXT

 1770DATA448,204,44,448,20
4,32,320,204,30,576,204,30
,448,300,30,448,976,44,448
,976,32,320,976,30,576,976
,30,448,880,30

 1771FORA%=10TO24STEP2:REA
DA$:PRINTTAB(30,A%)A$:NEXT
:ENDPROC

 1772DATAElephant,Lion,Tig
er,Leopard,Wolf,Dog,Cat,Mo
use
```

These changes alter the colours of the traps and dens, because when the blue player positioned his pieces on them it was difficult to make out the shapes as they were all white.

To change the colour it was easier to alter the order in which they were drawn and then change to blue halfway through.

This is why the DATA in line 1770 needs to be amended. Line 1760 simply switches colours.

There is still colour clash when you're not on your own traps, but if your opponent ventures on to them you will undoubtedly have been watching his movements – and remember how dangerous the animal is anyway.

The extra routine beginning at line 1771 displays the ranks of the animals in the spare space at the right of the screen. They are just presented in the same order as the table that was on page 95.

I also have a point to make on another subject. I'm sure that many people will have come across the following method for relocating Basic programs:

```
FOR T%=0 TO TOP-PAGE STEP
4 : T%!&E00 = T%!PAGE : N
EXT : PAGE = &E00 : RUN
```

*TOP-PAGE is the length of the program and as displayed when you use *INFO on a disc or load a tape using *OPT 1,2. PAGE is the address of the current program and location &E00 is the address it is to be moved down to so PAGE must be finally be reset to this.*

Relocating is mainly familiar to disc users with their loss of available memory and is especially useful in transferring tape games to disc.

Using the information above it is relatively simple to devise a method for relocating some machine code games:

```
*LOAD <name> 1900
*TAPE
FOR T% = 0 TO <length> S
TEP 4 : T%!&1900 : NEXT
CALL <exec addr>
```

*In the above example <name> is the filename of the main game, <length> is the third set of digits you get when you *INFO <name>, <addr> is the load address – in the first set of digits in *INFO <name> – and <exec addr> is the executing address – the second set of digits. Location &1900 is used because this is where the program is loaded on most systems.*

However, it is important to realise that if you are going to write a loader program for the game this may get overwritten by the relocation. It needs to be loaded in at a PAGE setting higher than that which the game may use, determined using:

```
PRINT ~ &1900 + <length>
```

This will return a hexadecimal figure which may need to be rounded up to suit PAGE. For example, if the result was 1CBA you would enter:

```
PAGE=&1D00
```

then the loader program could be CHAINed. The address &1900, again, is where the game is loaded into and <length> is also as before.

I have enjoyed reading The Micro User *over the past two years. Keep up the good work.* – **Trevor Johnson (age 15), Rugby, Warwickshire.**

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● **Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.**

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Beastiroids beats the odds

I'VE typed in Beastiroids from the June issue of The Micro User *and, although the Get it Right! checksums match, the program doesn't work. Have you any ideas what may be wrong?* – **A.E. Gillam, Gt. Waldingfield, Suffolk.**

● No checksum system can be 100 per cent successful – but the chance of ours failing to detect errors is extremely low. So, if the program doesn't work there is no option but to check the listing line by line until you find your typing error.

We know Beastiroids – as published – works, but have discovered the most likely places where your mistake may be. Line 1320 reads:

```
 1320 DATABf5E2Z5Lq^Y2\5=2g5L
2^b3o£3pa3n
```

The seventh character from the end of the line is a lower case letter o. If you have entered a zero instead then you'll get the same checksum – but the program will fail.

There is a similar situation in line 1690 which contains a capital O – not o.

If any of our mathematical readers know what the odds of this most common typing error fooling our checksums we'd love to hear.

Ringing the changes

SOME time ago a bell-ringing friend asked me to write a program to tell how many changes can be rung with a given number of bells.

This only needed a simple Basic program as follows:

```
   10MODE7
   20PRINT"CHANGES"
   30INPUT"HOW MANY BELLS ARE
THERE",bells
   40A=1:B=2
   50REPEAT
   60A=(A*B):B=B+1
   70UNTIL B=bells
   80PRINT A*B
```

The routine works fine but now I want to use it in another program which needs numbers up to 127 for bells.

I can get a satisfactory

Turn to Page 113 ►

result for numbers up to 12 and, by playing with @%, even 13. But after that the result is peculiar. For example, if bells *is 14 the result appears to be single digit followed by a string of decimals ending with a hexadecimal number.*

Is there anything I can do about it? – **Albert E. Yeo, Aldridge, Walsall.**

● The number you see is not hexadecimal but exponential – you multiply the first number by 10 to the power of the number following the E.

For 14 bells you get 8.71782912E10 and this means 8.71782912 x 10^{10}. In other words it's a large 8.7178212 x 10000000000 or 87178212000 changes.

You could write a routine to print numbers in ordinary decimal form rather than exponential, but the latter is easier to read once you understand it – and you'd soon run out of room on the line if you print numbers in the usual way.

Slow save

THE PC emulator review in the July issue said that Graphic Writer – a native Archimedes program – took 55 seconds to load and save documents.

This is incredibly slow but according to reviews the Archimedes ADFS is very fast – so what's the truth: Is it bad programming or something else? – **Clare Davies, Derby.**

● Unfortunately our reviewer made a mistake – Graphic Writer can load and save files complete with graphics in just two to three seconds – and that's actually three files for each document. With a hard disc you can expect almost instantaneous response.

Keep it under control

THE following explains some little known uses of control codes entered from the keyboard. They are not confined to the user-definable function keys, but can be used in filenames as well. On a disc system this can produce some interesting results. For example:

```
SA."|@ZAP!|U"
```

will save the current Basic program so that none of the other files appear in the catalogue – the |@ ensure that ZAP! appears at the beginning of the catalogue and |U turns the VDU output off.

```
SA."|!SECRET"
```

will save the current Basic program as SECRET so it does not appear in the catalogue at all.

```
SA."|!$.LOCKED
```

will save the current Basic program as $.LOCKED and lock it at the same time.

The last two features are possible because |! sets the top bit of the next character. The disc system does not display files that have this bit of the first character in the filename set and considers a file to be locked if the top bit of the directory character is set. – **Guy Haskell (Age 16), Reading, Berks.**

● This works on some but not all DFSs. You should note that if you use this method you may prevent your discs working on other micros.

Printer dumps

WITH reference to John Morrell's letter in the July issue of The Micro User *regarding screen dumps for a Canon PW-1080A, I haven't seen one published but it is one of at least 27 printers catered for on the Dumpmaster rom available from Beebug.*

Tim Powys-Lybbe, who wrote the routines, added the Microline 84 to the list as the 27th about a year ago, but I can't say if he's added any more since.

Screens can be dumped from all modes, including Mode 7, and there are a host of additional features. – **Chris Ridley, Whitley Bay, Tyne & Wear.**

PC podule please

I FIND it extremely disappointing that Acorn has decided to stop work on the Archimedes PC podule.

With the introduction of the new micro and the promise of the ability to run MSdos, it appeared that the BBC Micro user/enthusiast had no difficulty in justifying the upgrade. Alas, with only the PC emulator, I fear that this is not so.

Where I work we run several extremely useful programs on BBC Micros. These have been developed because the writer could work at home on his own equipment, identical to that at the office.

Now the work load has increased the company is buying PCs and that facility is lost, apart from the use of BBCBASIC(86) by M-TEC which we have found very satisfactory.

To make the most of all the proprietary programs now available, those of us who are interested need the MSdos facility. I have tried the 512 second processor with the Master 128, and found it to be wanting – as I suspect I would find the current PC emulator with the Archimedes.

For enthusiasts to remain faithful to the BBC Micro series, to be at the forefront of technology and at the same time to keep in step with the business world, the Archimedes in conjunction with the PC podule and suitable 5.25in disc drive must be more than simply very good – it has to be excellent.

Otherwise it remains a highly desirable and expensive toy that I, for one, will have reluctantly to sacrifice for a different type of micro – and I never believed that the day would come when I would write that. – **A. Wigand, Andover, Hants.**

● Our review of the PC emulator on Page 79 of

Shifting function keys around

CAN you please explain in step-by-step language how you program the keys on a BBC Micro to respond while the Shift and Control keys are held down?

I need to know how to do it both directly and as part of a program. – **Alan, via MicroLink.**

● This is quite simple. Four FX calls affect how the function keys in combination with the Shift and Control keys respond when pressed:

```
*FX225,n Function keys alone
*FX226,n Shift+function keys
*FX227,n Control+function
         keys
*FX228,n Shift+Control+
         function keys
```

The letter *n* should be replaced by a number which determines the exact effect:

```
n=0          Do nothing
n=1          Give *KEY string
n=2 to 255   Produce Ascii
             value of n+key
             number
```

You use the same method in or out of a program. For example, to make the function keys alone produce codes 128 to 137, Shift+function key produce 138 to 147, Control+function key give 148 to 157 and Shift+Control+function key produce the *KEY strings use this sequence:

```
*FX225,128
*FX226,138
*FX227,148
*FX228,1
```

The copy and cursor keys can also act as function keys (*KEY11 to *KEY15) by using *FX4,2. The User Guide contains all the details you need.

Mathematics has an ideal answer

£10 Prize letter

IN Mike Cook's Card Album Challenge in the July issue, before issuing the challenge he said: "There is no way to work out mathematically the average number of packs you will have to get to complete an album..."

But I thought it ought to be possible, and devoted some considerable permutational pondering to seeking a solution.

I wasn't successful in a rigorous approach, and it looked as if it would be tedious to continue on this line, so I tried to work out a general expression for the various probabilities at any given point in the collection process.

Eventually I arrived at the following mathematical method using these general parameters:

T = Total number of cards in the set.

C = Number of different cards to be collected, before being allowed to buy the remaining (T-C) cards.

N = Number of (different) cards in a pack.

P = Number of packets bought.

D = Number of different cards held after packs have been bought.

Now lets take a look at the actual treatment:

Consider any one of the cards in the second packet bought. Since we hold N different cards from the first packet, the probability that a new card will be the same as one of the N cards is N/T. So the probability that the new card will be different from any of the first N cards is (1–N/T).

For each pack bought, the average number of different cards added to the collection decreases by the factor (1–N/T). So after buying P packs the average number of different cards you have is:

```
D = N * (1+(1-N/T) + N * (1-N
/T)^2*...+N * (1-N/T)^(P-1))
```

This series is a geometrical progression which has a total of:

```
D = T * (1-(1-N/T)^P).
```

From this we can calculate directly the average number of different cards we can expect to have after buying P packs of N cards from a set of T cards.

Simple algebraic manipulation of this equation leads to another which provides the solution we need.

The average number of packs – P – required to get D different cards from a total set of T cards is:

```
P = LOG(1-D/T)/LOG(1-N/T)
```

Using this equation, with the conditions set in your problem – T=220, N=5, D=205 – we find that we need on average 116.817 packs – 117 rounded up to the next whole number. And at 5 cards for 15p this means an expenditure of £17.55 before buying the final 15 cards for 45p – a total of £18.

Other values of T, N, and D can be substituted to calculate the answer for any chosen conditions.

Note that it has been assumed that all the cards in a pack are different – a reasonable assumption but, if not, the solution becomes:

```
P = LOG(1-D/T)/(N * LOG(1-1/T))
```

This gives 117.896 rounded up to 118 for the number of packs needed on this assumption.

To compare this with a simulation I wrote a simple program in Basic to check out the validity of the above equation and found a general agreement for a wide range of conditions – using T from 50 to 600 – with 10 collections averaged.

In all cases the results agreed within the expected statistical variation.

Since the program took up to about 10 minutes to run 10 collections I wrote a 6502 routine to do the arithmetic. With this I ran the standard problem with T=220, N=5 and D=205 for 1024 collections. This took about 30 minutes, and two runs gave 117.70 and 117.12 as the average number of packs required.

The difference from the mathematical result quoted above is probably not significant. Certainly the formula gives in milliseconds a result comparable to a simulation taking an uncomfortably long time. – **Laurie Howe, Romford, Essex.**

---

the July 1988 issue shows that it is more than adequate for all well-behaved MSdos programs – and although Acorn has decided to scrap its PC podule we are sure you won't have long to wait for a third party company to come up with the goods.

!BOOT files on Master

WHEN I recently upgraded from a Model B to a Master, I found that a lot of the programs I had written involving the use of a !BOOT file to start them refused to function correctly if they contained a statement such as X=GET.

After careful attention to clearing of buffers and checking for sloppy programming generally I noticed that the problem was connected with the appearance of a mysterious sequence of characters with the Ascii code 32 – space – which defied all attempts to clear them from the keyboard or any other buffer.

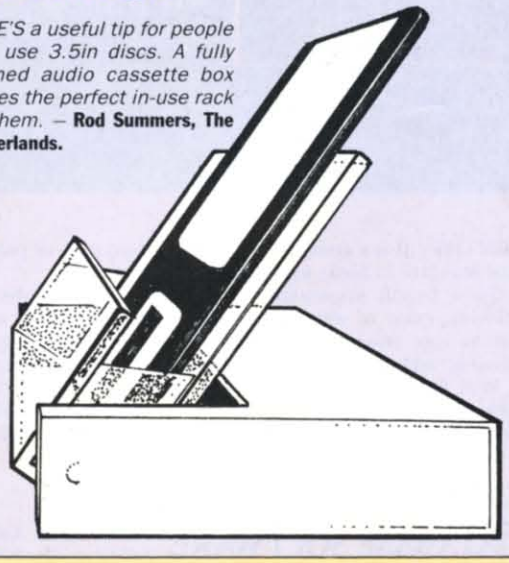
Also the problem did not occur when the programs were run after being loaded without using the !BOOT method.

*Eventually I tracked the cause down to the fact that the *EXEC file used by !BOOT requires to be closed on the Master. This had never been necessary on the Model B. It's very easily remedied by the use of a *FX119 command early in the program.*

Congratulations on an excellent magazine which I have read avidly since the first issue. – **Polly Kidd (age 11), Southport, Merseyside.**

Disc storage

HERE'S a useful tip for people who use 3.5in discs. A fully opened audio cassette box makes the perfect in-use rack for them. – **Rod Summers, The Netherlands.**



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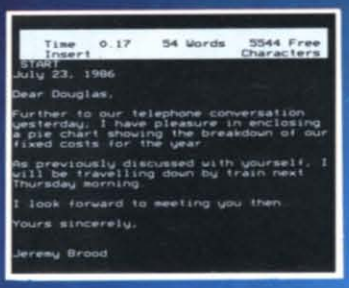

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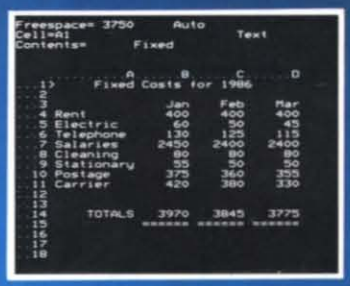

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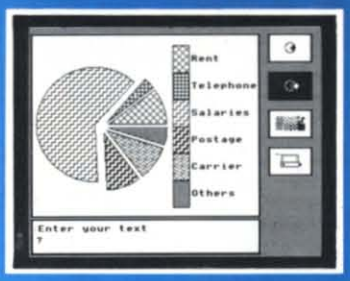

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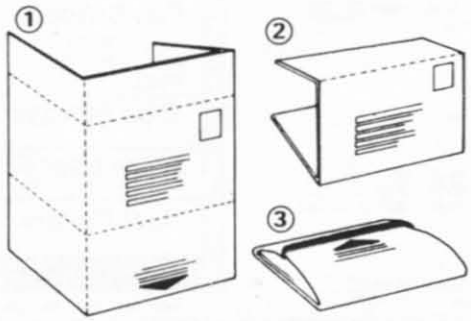

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